

# **Five-Year Review Report**

**Third Five-Year Review Report  
(Years 2005 through 2009)**

**for**

**W.R. Grace & Co., Inc. (Acton Plant) Superfund Site**

**Towns of Acton and Concord**

**Middlesex County, Massachusetts**

**September 2009**

**PREPARED BY:**

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## LIST OF ACRONYMS AND ABBREVIATIONS

ACRONYM	DEFINITION
1,1- DCE	1,1-Dichloroethene (also known as vinylidene chloride)
ACES	Acton Citizens for Environmental Safety
AAL	Allowable Ambient Limits
ARAR	Applicable or Relevant and Appropriate Requirement
ARS	Aquifer Restoration System
AWD	Acton Water District
AWQC	Ambient Water Quality Criteria
BEHP	Bis(2-ethylhexyl)phthalate
CDM	Camp, Dresser, & McKee Inc.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COPC	Contaminants of Potential Concern
CWA	Clean Water Act
D&A	Dewey & Almy
FS	Feasibility Study
GPs	Government Parties
M&E	Metcalf & Eddy, Inc.
MassDEP	Massachusetts Department of Environmental Protection
MCL	Maximum Contaminant Level
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PCE	Perchloroethene (also known as tetrachloroethene)
PPM	Parts Per Million
PRP	Potentially Responsible Party
RA	Remedial Action

<b>ACRONYM</b>	<b>DEFINITION</b>
RAC	Response Action Contract
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RD/RA	Remedial Design/Remedial Action
RfD	Reference Dose
RI	Remedial Investigation
ROD	Record of Decision
SDWA	Safe Drinking Water Act
SOW	Scope of Work
TBC	To Be Considered
TCA	1,1,1-Trichloroethane
TCE	Trichloroethene
TELs	Threshold Effects Exposure Limits
trans-1,2-DCE	trans-1,2-Dichloroethene
USEPA	United States Environmental Protection Agency
VC	Vinyl Chloride
VDC	Vinylidene Chloride (also known as 1,1-dichloroethene)
VOC	Volatile Organic Compound

## EXECUTIVE SUMMARY

The W.R. Grace & Co., Inc. (Acton Plant) Superfund Site (the Site) is a former chemical manufacturing facility composed of approximately 260 acres and located in the towns of Acton and Concord, Middlesex County, Massachusetts (see Figure 1, provided in Attachment 1 of this report). The Site is organized into three operable units (OUs), which are:

- OU-1 Disposal areas and surficial contamination areas at the Site;
- OU-2 Residual contamination in disposal areas at the Site following implementation of OU-1; and
- OU-3 Contaminated groundwater and associated sediment and surface water contamination

The selected remedy identified in the 1989 Record of Decision (ROD) for OU-1 included excavation of contaminated material from various source areas, off-site incineration of highly contaminated soil and sludge, and on-site solidification of less contaminated soil, sludge, and sediment after removal of volatile organic compounds (VOCs) by heat. Solidified waste was then disposed on-site in the Industrial Landfill, an unlined landfill that was already in existence at the Site and used by W.R. Grace for disposal of various wastes and sludges. The remedy included capping of the Industrial Landfill following placement of solidified waste within it, landfill gas collection and treatment, and grading of the excavated waste areas. The remedy established soil cleanup goals for each source area and established post-excavation sampling and analysis requirements to determine whether soil cleanup goals had been met. Five indicator compounds, vinylidene chloride (VDC), vinyl chloride (VC), ethylbenzene, benzene, and bis(2-ethylhexyl)phthalate (BEHP), were selected to represent the chemical contamination in the waste disposal areas. Attaining the soil cleanup goals for these five compounds would reduce the level of soil contamination in the source areas so that the concentrations of contaminants in water that migrated through the source areas would not exceed drinking water standards when it reached groundwater. In addition, prior to the 1989 ROD, an Aquifer Restoration System (ARS) was put in place to address groundwater contamination at the Site. This system is currently in operation and is discussed in this five-year review along with the remedy selected in the 1989 ROD for OU-1.

The 1989 ROD stated that a remedy for OU-2 would be necessary only if, following completion of the OU-1 remedy, residual contamination in soils under the source areas exceeded soil cleanup goals established for OU-1. Data collected during and after the completion of the OU-1 remedy indicated that the soil cleanup goals were met for each of the source areas, and therefore no remedy for OU-2 was necessary.

The ROD for OU-3 was issued in 2005. The selected remedy identified in the 2005 ROD for groundwater and sediments at the site includes: active treatment of contaminated groundwater, monitored natural attenuation of groundwater beyond the active treatment zones, institutional controls to restrict groundwater use until cleanup objectives have been met, and cleanup of contaminated sediments in Sinking Pond and the North Lagoon Wetland.

The remedial designs for the components of the OU-3 remedy are currently being prepared by W. R. Grace with oversight by USEPA and MassDEP, in accordance with a Remedial Design/Remedial Action Statement of Work executed in August 2006.

This is the third statutory Five-Year Review for the W. R. Grace & Co., Inc. (Acton Plant) Superfund Site. This Five-Year Review evaluates the OU-1 remedy along with discussing the ARS. The first five-year review was completed in September 1999. The second Five-Year Review was completed in September 2004, and that date is the trigger for this third five-year review. The Five-Year Review is required because hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure.

### **Protectiveness Statement**

This Five-Year Review concludes that the remedy for OU-1 currently protects human health and the environment. Soil in excess of cleanup levels has been excavated, stabilized, and either placed in the Industrial Landfill or shipped off-site for treatment and disposal. The Industrial Landfill was then sealed/closed with an impermeable cap designed and constructed in accordance with Massachusetts Hazardous Waste Regulations for landfills specified at 310 CMR 30.580-595 and 30.620-633. The Industrial Landfill is owned and maintained by W.R. Grace, access is restricted by a fence, and a deed notice has been filed with the Registry of Deeds that puts parties on notice that the landfill cannot be disturbed except by written permission of MassDEP. In order for the remedy at OU-1 to be protective in the long-term, additional institutional controls for the Industrial Landfill should be put in place so that the integrity of the cap is maintained. Additional maintenance is also needed at the Industrial Landfill in order for the remedy at OU-1 to be protective in the long-term.

There is no protectiveness statement for OU-2 because it was determined that a remedy for OU-2 was not needed.

The remedial design/remedial action is currently underway for OU-3. The remedy at OU-3 is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

## Five-Year Review Summary Form

SITE IDENTIFICATION		
<b>Site name (from WasteLAN):</b> W.R. Grace and Co., Inc. (Acton Plant)		
<b>EPA ID (from WasteLAN):</b> MAD001002252		
<b>Region:</b> 01	<b>State:</b> MA	<b>City/County:</b> Acton and Concord/Middlesex County
SITE STATUS		
<b>NPL status:</b> <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify)		
<b>Remediation status</b> (choose all that apply): <input checked="" type="checkbox"/> Under Construction <input checked="" type="checkbox"/> Operating <input type="checkbox"/> Complete		
<b>Multiple OUs?*</b> <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	<b>Construction completion date:</b> OU1: June 17, 1997	
<b>Has site been put into reuse?</b> <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
REVIEW STATUS		
<b>Lead agency:</b> <input checked="" type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency		
<b>Author name:</b> Derrick Golden		
<b>Author title:</b> Remedial Project Manager	<b>Author affiliation:</b> U.S. EPA	
<b>Review period:**</b> 10/1/2004 to 9/30/2009		
<b>Date(s) of site inspection:</b> June 18, 2009		
<b>Type of review:</b> <input checked="" type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal only <input type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> NPL State/Tribe-lead <input type="checkbox"/> Regional Discretion		
<b>Review number:</b> <input type="checkbox"/> 1 (first) <input type="checkbox"/> 2 (second) <input checked="" type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify)		
<b>Triggering action:</b> <input type="checkbox"/> Actual RA Onsite Construction at OU1____ <input type="checkbox"/> Actual RA Start at OU#____ <input type="checkbox"/> Construction Completion <input checked="" type="checkbox"/> Previous Five-Year Review Report <input type="checkbox"/> Other (specify)		
<b>Triggering action date (from WasteLAN):</b> September 29, 2004		
<b>Due date (five years after triggering action date):</b> September 29, 2009		

\* ["OU" refers to operable unit.]

\*\* [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]



## Five-Year Review Summary Form, cont'd.

### Issues:

Additional Institutional Controls will be required for the Industrial Landfill to ensure the protectiveness of the remedy in the future. Site wide Institutional Controls are currently being developed under OU3 remedial design activities.

Assessment of additional operation & maintenance options for the Industrial Landfill is needed, i.e., more frequent removal of weeds and grass clippings from the swales and/or improvements to the drainage system.

### Recommendations and Follow-up Actions:

Evaluate options for institutional controls and implement as part of the Institutional Control Plan required under the RD/RA Scope of Work. We will assess additional operation & maintenance options, i.e., more frequent removal of weeds and grass clippings from the swales and/or improvements to the drainage system.

### Protectiveness Statement(s):

**OU-1:** This Five-Year Review concludes that the remedy for OU-1 currently protects human health and the environment. Soil in excess of cleanup levels has been excavated, stabilized, and either placed in the Industrial Landfill or shipped off-site for treatment and disposal. The Industrial Landfill was then sealed/closed with an impermeable cap designed and constructed in accordance with Massachusetts Hazardous Waste Regulations for landfills specified at 310 CMR 30.580-595 and 30.620-633. The Industrial Landfill is owned and maintained by W.R. Grace, access is restricted by a fence, and a deed notice has been filed with the Registry of Deeds that puts parties on notice that the landfill cannot be disturbed except by written permission of MassDEP. In order for the remedy at OU-1 to be protective in the long-term, additional institutional controls for the Industrial Landfill should be put in place so that the integrity of the cap is maintained. Additional operation & maintenance options for the Industrial Landfill, i.e., more frequent removal of weeds and grass clippings from the swales and/or improvements to the drainage system are needed in order for the remedy at OU-1 to be protective in the long-term.

**OU-2:** There is no protectiveness statement for OU-2 because it was determined that a remedy for OU-2 was not needed.

### OU-3:

The remedial design/remedial action is currently underway for OU-3. The remedy at OU-3 is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

### Other Comments:

Groundwater in the vicinity of the Industrial Landfill is currently being extracted and treated by an Aquifer Restoration System (ARS) that was constructed by W. R. Grace in 1985, prior to the 1989 ROD. The groundwater extraction wells and the groundwater treatment equipment and extraction locations that comprise the ARS are being re-designed as required by the 2005 ROD and the new systems are expected to come on line prior to the next Five-Year Review. While the new system is being designed, the current ARS has been modified to accommodate two newly installed extraction wells that will be part of the remedy and will remain in operation. The Acton Water District provides treatment of groundwater from the five public water supply wells in the vicinity of the Site, and the Acton Board of Health has an administrative hold in issuing permits for private irrigation wells within the plume area. Areas of contaminated sediment are located within land owned by W. R. Grace and are currently not in use, so there is no current risk to human health from exposure to sediment, since current exposures are limited to the occasional trespasser. In addition, the second five-year review evaluated vapor intrusion as a potential pathway and concluded that the risk from this potential pathway was negligible at the W. R. Grace site. Hence, exposure pathways that could result in unacceptable risks to human health are being controlled, while the Remedial Design/Remedial Action process for OU-3 continues.

## SECTION 1.0 INTRODUCTION

This document is a comprehensive and interpretive report on the Five-Year Review conducted for the W. R. Grace & Co., Inc. (Acton Plant) Superfund Site (the Site) in Acton and Concord, Massachusetts, by the U.S. Environmental Protection Agency (USEPA) Region I.

The purpose of this Five-Year Review is to determine whether the remedies for the Site are protective of human health and the environment. The methods, findings, and conclusions of the review are documented in this Five-Year Review report. In addition, Five-Year Review reports identify issues found during the review, if any, and provide recommendations to address them.

EPA Region I has conducted this Five-Year Review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Contingency Plan (NCP). CERCLA §121 states:

*If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The NCP part 300.430(f)(4)(ii) of the Code of Federal Regulations (CFR) states:

*If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

This is the third Five-Year Review for the Site. The completion of the second Five-Year Review, in September 2004, is the trigger for this third Five-Year Review. This statutory review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure.

## SECTION 2.0 SITE CHRONOLOGY

The chronology of the Site, including significant site events and dates, is included in Table 1.

<b>Table 1: Chronology of Site Events</b>	
<b>Event</b>	<b>Date</b>
Dewey & Almy Chemical Company manufactures various products at the Acton site at various times, such as: latex, resins, plasticizers, and paper battery separators	1945 – 1954
W.R. Grace acquires Dewey & Almy and continues various chemical manufacturing processes at the Acton site	1954 – 1991
Organic contaminants (vinylidene chloride, vinyl chloride, ethylbenzene, and benzene) detected in municipal wells, Assabet #1 and #2	1978
The United States sues W.R. Grace to require cleanup of the Site	April 17, 1980
MassDEP issues an Administrative Order to W.R. Grace, specifying procedures and requirements for evaluating and correcting Site contamination	July 14, 1980
W.R. Grace and EPA enter into a Consent Decree to clean up waste disposal areas and restore groundwater in drinking water aquifers. The provisions of the Consent Decree are similar to the requirements of the July 14, 1980 MassDEP Administrative Order.	October 21, 1980
MassDEP issues an Amended Order to W.R. Grace, amending MassDEP's July 14, 1980 order to conform with the Consent Decree language	April 15, 1981
Site added to the National Priorities List	September 8, 1983
Aquifer Restoration System construction completed and operation begins	March 1985
Phase IV Report and Addendum, detailing the OU-1 remedy, was completed by Camp, Dresser & McKee (CDM) for W.R. Grace	June 6, 1989
Risk Analysis Report completed by Alliance Technologies Corporation for EPA	June 30, 1989
Record of Decision for OU-1 signed by Paul G. Keough, Acting Regional Administrator	September 29, 1989
CDM issued Remedial Design/Remedial Action (RD/RA) Work Plan for OU-1	January 1991
CDM issued report on Field Pilot Programs for upgrading air stripping tower portion of ARS	May 1991
Quarterly well monitoring begins	March 1992

<b>Table 1: Chronology of Site Events</b>	
<b>Event</b>	<b>Date</b>
Odor controls for air-stripping tower installed and operational; Site security measures implemented	September 1992
CDM submitted revised 100% design package for OU-1 remedial action	August 1993
GZA issued Final Site Work Plan and Construction Quality Control Plan for OU-1 remedial action	July 1994
OU-1 Remedial Action initiated; Air monitoring system installed	October 17, 1994
Landfill gas treatment system delivered and installed; Permanent fencing around landfill installed	March 1997
Final site inspection performed	June 1997
Remedial Action Report for OU-1 issued by EPA	September 30, 1997
Revised Construction Quality Assurance Closeout Report for OU-1 issued by CDM for W.R. Grace	February 1998
Statement of Work for OU-3 Remedial Investigation/Feasibility Study is signed	March 25, 1998
First 5-year review report issued by EPA for the Site	September 1999
Draft Remedial Investigation Report and Phase 2 Work Plan for OU-3 issued by GeoTrans for W.R. Grace	August 30, 2002
Phase 2 Remedial Investigation Report issued by GeoTrans for W.R. Grace	May 14, 2003
Draft Baseline Ecological Risk Assessment issued by Menzie- Cura for W.R. Grace	July 30, 2004
Draft Public Health Risk Assessment Deliverable 3 issued by Menzie-Cura for W.R. Grace	August 5, 2004
Second 5-year review report issued by EPA for the Site	September 29, 2004
Public Review Remedial Investigation and Feasibility Study Reports for OU-3 issued by GeoTrans for W.R. Grace	July 1, 2005
Proposed Plan for OU-3 released to public	July 8, 2005
Public Meeting on Proposed Plan for OU-3	July 19, 2005
Public Hearing on Proposed Plan for OU-3	August 4, 2005
OU-3 ROD signed	September 30, 2005
W.R. Grace and EPA come to agreement on a Remedial Design/Remedial Action Statement of Work for OU-3	August 30, 2006
Approval for performing a topographical survey and wetland assessment/delineation is granted by EPA and MassDEP	April 3, 2007

<b>Table 1: Chronology of Site Events</b>	
<b>Event</b>	<b>Date</b>
Sediment Pre-Design Work Plan is Conditionally Approved by EPA	July 24, 2007
Landfill Area and Northeast Area Groundwater Pre-Design Work Plans are Conditionally Approved by EPA	August 30, 2007
Request to Discontinue Pumping from Existing Recovery Well RLF is Conditionally Approved by EPA, with Existing Recovery Well ELF to remain operational until new recovery wells (SELF-1 and SWLF-1) are brought on line	January 15, 2008
Northeast Area Groundwater Pre-Design Results Report Conditionally Approved by EPA	November 26, 2008
Petition to discontinue pumping from extraction wells NLBR-R, NLGP, SLBR, and SLGP-R in the Former Lagoon Area is Conditionally Approved by EPA	January 9, 2009
Sediment Pre-Design Results Report Conditionally Approved by EPA	February 26, 2009
Northeast Area Groundwater Concept Design Conditionally Approved by EPA	April 24, 2009
Landfill Area Groundwater Pre-Design Results Report Conditionally Approved by EPA	June 9, 2009

## **SECTION 3.0 BACKGROUND**

### **3.1 PHYSICAL CHARACTERISTICS AND LAND AND RESOURCE USE**

The W.R. Grace & Co., Inc. (Acton Plant) Superfund Site (the Site) is a former chemical manufacturing facility which occupies approximately 260 acres in Acton and Concord, Massachusetts (see Figure 1 provided in Attachment 1 of this report). The Site is located off Independence Road and is bounded to the northwest by Fort Pond Brook and to the southeast by the Assabet River. The Site is bounded by industrial parks to the south and northeast, and by residential housing to the northwest, east, and west. A sand and gravel pit is located south of the Site. All buildings associated with the former chemical manufacturing operations have been demolished. Only those buildings associated with the remedial action currently exist on the Site.

Waste disposal areas identified on-site include the former Battery Separator Area, the former Blowdown Pit, the former Primary Lagoon, the former North Lagoon, the former Tank Car Area, the former Secondary Lagoon, the former Emergency Lagoon, the former Boiler Lagoon (located between the Battery Separator Area and the Tank Car Area), the former Acid Neutralization Pit, and the Industrial Landfill (see Figure 2, provided in Attachment 1 of this report).

Groundwater beneath the Site is classified as GW-1 by MassDEP, defined as a current or potential future drinking water source area. The Site straddles a groundwater divide, so groundwater from the Site flows either to the northwest toward Fort Pond Brook or to the southeast and south toward the Assabet River. The Assabet Wellfield, which supplies water for the Town of Acton, is located southwest of the Site. The wellfield consists of two municipal drinking water wells, Assabet #1 and Assabet #2A. Assabet #2A replaced Assabet #2 as a public water supply well in May 2001. Presently, both wells are operating, and the extracted water is treated with an air stripping unit prior to public distribution. The Acton Water District is currently in the process of developing Assabet 3 as a future public supply well within this area. Assabet 3 was a former production well used by W.R. Grace when the Acton manufacturing facility was operational. The Lawsbrook, Scribner, and Christofferson wells, comprising the School Street Wellfield, are located approximately 3,700 feet north of the Site. All three wells are within the Fort Pond Brook watershed. The Scribner and Lawsbrook wells are 150 and 1,000 feet south of Fort Pond Brook, respectively. The Christofferson well is immediately north of Fort Pond Brook. Water from the the School Street wells is also treated using an air stripper prior to public distribution.

In addition to the five public wells, six private water supply wells (1 Lisa Lane, 5 Bellantoni Drive, Powder Mill Plaza, Valley Sports Arena, and two wells at the Starmet-Nuclear Metals Superfund Site property) were identified during the private well survey conducted for the Site. The Lisa Lane and Bellantoni Drive wells were located in a residential area north of the W.R. Grace property and south of the School Street Wellfield. Both wells withdrew water from the bedrock aquifer for residential irrigation. When it was discovered that these two wells were within the plume from the Site, the well at 1 Lisa Lane was converted into a monitoring well, and the well at 5 Bellantoni Drive was properly decommissioned. The other four wells identified during the private well survey were found to be unaffected by Site-related contaminants.

### **3.2 HISTORY OF CONTAMINATION**

The Site is a former chemical manufacturing facility, used for industrial purposes for over one hundred years. American Cyanamid Company and the Dewey & Almy Chemical Company (D&A) were former occupants of the Site. American Cyanamid manufactured explosives, and D&A produced synthetic rubber container sealant products, latex products, plasticizers, and resins. W. R. Grace acquired the property in 1954, and chemical operations were continued at the Site. Operations at the W. R. Grace facility included the production of materials used to make concrete and organic chemicals, container

sealing compounds, latex products, and paper and plastic battery separators. Wastewater and solid industrial wastes from these operations were disposed of in several unlined lagoons (the Primary Lagoon, Secondary Lagoon, North Lagoon, and Emergency Lagoon), and were buried in or placed onto an on-site Industrial Landfill and several other waste sites (see Figure 2). These other waste sites include the Battery Separator Area (lagoon and chip pile), the Tank Car Area, and the Boiler Lagoon which was located between the Battery Separator and Tank Car Areas. Periodically, sludge from the Primary Lagoon was dredged, dried along the banks, and trucked to the landfill for disposal. In addition, the by-products of some chemical processes were disposed of in the Blowdown Pit. Discharge to all lagoons and the Battery Separator Area ceased in 1980. The production of organic chemicals was discontinued in 1982. A small distribution center for concrete additives was moved to another location in September 1996. A second plant for the manufacture of battery separators, known as the Daramic facility, was constructed in 1979, but operations there ceased in 1991. All buildings, with the exception of those associated with the remedial actions, have been demolished.

Investigations in 1978 indicated that two Acton municipal wells, Assabet #1 and Assabet #2, were contaminated with vinylidene chloride (VDC, also known as 1,1-dichloroethene or 1,1-DCE). Significant levels of vinyl chloride (VC), ethylbenzene, and benzene were also detected in these wells. Shortly thereafter, the Town took the precautionary action of closing the two wells. As a result of the discovery of the municipal well contamination, W. R. Grace and EPA entered into a Consent Decree requiring cleanup of the Site in October 1980 (1980 Consent Decree) under the Resource Conservation and Recovery Act. A similar settlement was reached between W.R. Grace and the state of Massachusetts. In September 1983, the Site was added to the National Priorities List (NPL).

### 3.3 INITIAL RESPONSE

The 1980 Consent Decree outlined the procedural framework for cleanup of the Site. One requirement of the Consent Decree was cleanup and restoration of the drinking water in the aquifer, the source of water for Assabet Wells #1 and #2. W. R. Grace initiated development of an engineering plan for aquifer cleanup which included a recovery well network to capture contaminated groundwater and prevent further off-site migration. Contaminated groundwater extracted from the network of wells would be pumped to a central treatment facility or treated at the well-head. Following EPA and State approval of this cleanup plan, construction of the Aquifer Restoration System (ARS) was begun in December 1983. Construction of the ARS was completed in March 1985. As explained below, parts of the ARS extraction well network were deactivated in 2002 and in 2008, while other parts remain in operation as part of the groundwater remedy. As required by the 2005 ROD, the ARS treatment system will be replaced by a new treatment system currently being designed by W. R. Grace.

The 1980 Consent Decree also required W.R. Grace to assess and control sources of waste on-site using a phased investigation under EPA oversight. In Phases I and II, W.R. Grace prepared plans for studying and determining the nature and extent of contamination at the source areas, and after EPA approval, performed the study. In Phase III of the source area investigation, W.R. Grace identified, analyzed, and evaluated cleanup and remedial measures for the source areas. Following conditional approval of the Phase III scope of work, W.R. Grace performed the evaluations and submitted the results to EPA in a Phase IV Report. The final draft of the Phase IV Report was submitted to EPA on August 31, 1988. Following a series of meetings to discuss revisions to the report, W.R. Grace submitted an Addendum to the draft Phase IV Report on June 6, 1989. The remedial measures evaluated in the Phase IV Report and Addendum provided the basis for the remedy that was selected in the ROD for OU-1, signed on September 29, 1989.

As described in the Record of Decision (ROD) for OU-1, the Site remedy was organized into three operable units (OUs):

- OU-1 Disposal areas and surficial contamination areas at the Site;

- OU-2 Residual contamination in disposal areas at the Site following implementation of OU-1; and
- OU-3 Contaminated groundwater in the area of the Grace facility that is not contained or adequately addressed by the Aquifer Restoration System. OU-3 also includes contaminated sediments and surface water.

### 3.4 BASIS FOR TAKING ACTION

Two major series of investigations have been conducted at the Site. The first occurred in the 1980s and led to construction of the ARS, development of the 1989 ROD for OU-1, and cleanup of the source areas at the Site. The second set of investigations, conducted mainly between 2000 and 2002, resulted in development of the 2005 ROD for OU-3 and led to the remedial designs that are currently underway.

#### 3.4.1 OU-1

The investigations of the nature and extent of contamination at the Site that were conducted in the 1980s were focused on source areas and groundwater. The contaminants that were detected in various media at the Site during those investigations are summarized below.

**Soil & Sludge.** Soil and sludge were identified as “surface materials” in the 1989 ROD. The Blowdown Pit contained the most highly contaminated material on the Site (primarily VDC), while material in and under the Boiler Lagoon demonstrated lower contaminant levels than the other lagoons.

VDC, VC, benzene, and ethylbenzene were the primary contaminants identified in the Primary Lagoon, Secondary Lagoon, and Emergency Lagoon sludge and underlying soils. Benzene, toluene, and ethylbenzene were the prominent compounds in soils underlying the Industrial Landfill. In North Lagoon sludges and underlying soils, VOC contamination was detected along with phthalates, metals, and cyanide. The principal contaminants found in Boiler Lagoon sludges and underlying soils were phthalates and metals, while VDC, benzene, ethylbenzene, formaldehyde, phenol, and metals predominated in Battery Separator Area soils/sludges. Soils in the Tank Car Area were contaminated with VDC, phthalates, and metals. Eight chemicals were selected for evaluation in the risk assessment. The eight chemicals included: VDC, VC, benzene, toluene, ethylbenzene, formaldehyde, arsenic, and cadmium.

**Groundwater.** Fifteen groundwater contaminants were identified as indicator chemicals in the 1989 ROD for OU-1. The fifteen indicator chemicals were VDC, VC, benzene, toluene, ethylbenzene, trichloroethene (TCE), formaldehyde, arsenic, beryllium, cadmium, chromium, copper, lead, nickel, and zinc.

**Surface Water.** VDC and 1,1,1-trichloroethane (TCA) were detected in surface water samples from the Assabet River. VDC, benzene, toluene, xylene, tetrachloroethene (PCE) and chloroform were detected in Fort Pond Brook surface water samples.

A risk assessment was performed by Alliance Technologies Corporation (Alliance, 1989) that evaluated future human health risks associated with site-wide exposure to surface materials and groundwater, and specific source area exposures assuming residential use of the property. The risk assessment concluded that the W. R. Grace property was likely to pose significant carcinogenic and non-carcinogenic risk to human health in the event the property was developed and used for residential purposes, in the absence of remediation. Significant groundwater risk contributors included VDC, VC, arsenic, lead, and zinc. Risks associated with exposure to surface material were primarily attributed to VDC, VC, and arsenic. These conclusions formed the basis of the selected remedy for OU-1 and OU-2. The OU-1 remedial actions, summarized in the next section of this report, were completed in 1997, and no follow-up OU-2



actions were needed.

### 3.4.2 OU-3

The objectives for the investigations associated with OU-3, which were described in the OU-3 Remedial Investigation/Feasibility Study (RI/FS) Statement of Work (approved by EPA and MassDEP April 1998), were to define the extent of groundwater contamination and its impacts, if any, on surface water, sediments, and air at the Site. The RI for OU-3 began with the preparation of an Initial Site Characterization Report (ISCR) by HSI GeoTrans in August 1998. The data gaps that were identified in the ISCR were addressed by investigations conducted between April 2000 and November 2002. Human health and ecological risk assessments were completed in 2005. The contaminants that were detected at the Site as a result of the remedial investigations and sampling for the risk assessments are summarized, by medium, below.

**Groundwater.** The primary chemicals that were identified as groundwater contaminants at the Site include VDC, VC, benzene, 1,2-dichloropropane, 1,2-dichloroethane, methylene chloride, bis (2-ethylhexyl) phthalate, arsenic, and manganese. Contaminants that were detected less frequently include TCE, methyl-tert-butyl-ether, 1,4-dioxane, chromium, and nickel.

**Sediment.** The Human Health Risk Assessment identified future risks to receptors from exposure to sediments in North Lagoon Wetland and in Sinking Pond. Unacceptable risks to potential future recreational receptors (waders) were identified in Sinking Pond and in North Lagoon wetland due to elevated arsenic in sediments.

Unacceptable risks to the environment were also identified and attributed to arsenic in portions of Sinking Pond (above the thermocline) in water less than 12 feet deep, and to exposure to elevated concentrations of other metals in sediments of Sinking Pond including manganese, iron, and copper. The band of shallow water around the pond posing a risk to ecological receptors overlaps with areas of potential human exposure and risk to human receptors from swimming/wading. Risks to ecological receptors in sediments of the North Lagoon Wetland were attributed to arsenic and manganese.

**Surface Water.** VDC and TCA were detected in surface water samples from the Assabet River. VDC, benzene, toluene, xylene, PCE, and chloroform were detected in Fort Pond Brook surface water samples.

These conclusions formed the basis of the selected remedy for OU-3 of the Site. The OU-3 remedial design is currently in progress.

## SECTION 4.0 REMEDIAL ACTIONS

### 4.1 REMEDY SELECTION

This section of the report describes the selected remedies for the three operable units (OU-1, OU-2, and OU-3) that comprise the site.

#### 4.1.1 OU-1

The ROD for Operable Unit 1 was signed on September 29, 1989. This ROD addressed the first of three operable units planned for the Site. The remedial action objectives as presented in the ROD for the Site were to:

1. *Protect exposure points, where humans or wildlife may be exposed to contaminants in soil, groundwater, surface water, and sediments, during and after site remediation.*
2. *Prevent the migration of contaminants in groundwater from sources on-site to public drinking water supplies.*
3. *Protect on- and off-site groundwater from contamination by site contaminants in excess of drinking water quality.*
4. *Eliminate the potential for contact in the future with waste materials by the public and the environment.*
5. *Protect on- and off-site surface water from contamination by site contaminants.*
6. *Prevent the migration of contaminated run-off from the waste sites.*
7. *Protect against direct contact with site contaminants and minimize environmental exposure during remedial activities.*
8. *Reduce to the maximum extent practicable the number of source areas to eliminate long-term management and permit unrestricted use.*

The goals of the selected remedy were to protect the drinking water aquifer by minimizing further contamination of the groundwater and surface water, and to eliminate the threats posed by direct contact with or ingestion of contaminants in soil and waste sludges at the Site.

The selected remedy for OU-1 (source control), as identified in the ROD, consisted of the following components:

- *Excavation and transportation off-site for incineration of highly contaminated material from the Blowdown Pit;*
- *Excavation and stabilization of the remaining contents of the Blowdown Pit, as well as the contaminated sludges and soils of the Primary Lagoon, Secondary Lagoon, North Lagoon, and Emergency Lagoon;*
- *Excavation of contaminated soils from the Battery Separator Lagoons, Boiler Lagoon, and Tank Car Area;*
- *Placing both the stabilized and the non-stabilized materials excavated from the Site on the*

*existing Industrial Landfill, and covering these materials with an impermeable cap;*

- *Post-excavation sampling and analysis;*
- *Capping the Battery Separator Chip Pile;*
- *Covering any disposal area which attains the soil cleanup goals;*
- *Modifying the ARS to address air stripper emission controls; and*
- *Establishing long-term environmental monitoring at each disposal area designed to monitor the effectiveness of the proposed remedy.*

#### **4.1.2 OU-2**

The ROD for OU-1 stated that a remedy for OU-2 would be necessary only if, following completion of the OU-1 remedy, residual contamination in soils under the source areas exceeded soil cleanup goals established for OU-1. Data collected during and after the completion of the OU-1 remedy indicated that the soil cleanup goals were met for each of the source areas; therefore, no remedy for OU-2 was necessary (USEPA, 1999).

#### **4.1.3 OU-3**

The ROD for Operable Unit 3 was signed on September 30, 2005. This ROD addresses the third and final operable unit for the Site.

The goals of the selected remedy are to restore the drinking water aquifer and to eliminate the threats posed by direct contact with or ingestion of contaminants in sediment in the North Lagoon Wetland and Sinking Pond.

The selected remedy for OU-3, as identified in the ROD, consists of the following components:

- *Cleanup of contaminated sediments and soils posing an unacceptable risk to human health and/or the environment in Sinking Pond and the North Lagoon Wetlands;*
- *Extraction and treatment of groundwater contamination in the Southeast and Southwest Industrial Landfill Areas on the Grace property and at targeted areas in the Northeast Area;*
- *A redesigned and/or modified Aquifer Restoration System that will treat extracted groundwater for both metals and organic contaminants. Treatment processes for extracted groundwater would include air-stripping, activated carbon (air treatment), and metals precipitation prior to surface water discharge to Sinking Pond;*
- *Monitored Natural Attenuation of areas of groundwater contamination not captured by the extraction system;*
- *Institutional Controls such as deed restrictions and/or local ordinances to prevent unacceptable exposures to contaminated groundwater until cleanup levels are met and to protect against unacceptable future exposures to any wastes left in place on-Site;*
- *Long-term groundwater, surface water, and sediment monitoring, and periodic Five-Year Reviews of the remedy.*

## 4.2 REMEDY IMPLEMENTATION

### 4.2.1 OU-1

The remedial design/remedial action activities for OU-1 were performed by W. R. Grace under the 1980 Consent Decree. For more detailed information on OU-1 remedial activities, see the Remedial Action Report for Operable Unit One, which was prepared by Foster Wheeler Environmental Corporation (September 1997).

Consistent with the 1989 ROD the following work has been conducted at the Site:

- The contents of the Battery Separator Lagoons, Boiler Lagoon, and the Tank Car Area were excavated to a depth of at least five feet. Additional excavation greater than five feet in depth was performed until the soil cleanup goals (see page 30 of the 1989 ROD) were met. These materials were then placed on the Industrial Landfill. The contaminant level of all excavated materials from these areas was analyzed prior to placement on the landfill. If unexpected levels of contaminants were detected that could present implementation problems or impact the effectiveness of the landfill remedy, then those materials were stabilized prior to placement on the landfill or were disposed of off-site. Post-excavation sampling and analysis was conducted to ensure that soil cleanup goals were attained.
- Sludges and at least two feet of soil in each of the Primary, Secondary, and Emergency Lagoons were excavated, stabilized using the VFL process (developed by VFL Technology Corporation and consisting of mixing contaminated soils/sludges with quicklime, flyash, and portland cement), and placed on the Industrial Landfill. Additional excavation greater than two feet in depth was performed until the soil cleanup goals were met. Sediments from the North Lagoon were removed to a depth equivalent to the low groundwater level. These sediments were trucked to the treatment area, stabilized using the VFL process and placed on the Industrial Landfill. Materials in the Blowdown Pit containing greater than 100 parts per million (ppm) of VDC were excavated and shipped to an off-site disposal facility. Remaining sludge and other contaminated materials and at least two feet of underlying soil were excavated, stabilized using the VFL process and placed on the Industrial Landfill. Post-excavation sampling was then conducted to ensure that soil cleanup goals were attained.
- The Industrial Landfill was covered with excavated soils and then with stabilized materials from the lagoons and Blowdown Pit and then graded using excavated materials from the other waste disposal areas. The landfill was then sealed/closed with an impermeable cap designed and constructed in accordance with Massachusetts Hazardous Waste Regulations for landfills specified at 310 CMR 30.580-595 and 30.620-633. The impermeable cap included a synthetic cover to prevent infiltration of surface water into the waste materials beneath the cap.

The cap was also constructed with vents to allow gases generated from the existing and new material to vent to the surface outside the landfill. Emissions from the Industrial Landfill were initially controlled utilizing a thermal oxidation unit, but, after proper evaluation, have since been allowed to vent passively to the atmosphere (USEPA, 2002).

Additionally, a groundwater monitoring and recovery system was designed and installed at the Industrial Landfill to supplement the existing ARS recovery wells.

- Originally, the Battery Separator Chip Pile was to be capped in place, but the need to remove the underlying soils made in-place capping not feasible. Therefore, the battery separator chips were excavated and placed in the Industrial Landfill and were covered with non-solidified material excavated from the source areas.

- Prior to implementation of the remediation work provided for in the ROD for OU-1, W.R. Grace constructed an ARS. This system began treating contaminated groundwater that was extracted from bedrock and overburden wells through an air stripping tower. The ARS began operation in March 1985 and has continued, with modifications, to treat groundwater through the present. The air stripping tower component of the ARS required upgrading by installing carbon filters to control vapors and odors; these upgrades were completed in September 1992 (Foster Wheeler, 1997).

All of the above remedial action activities were completed and the contractor, Camp, Dresser & McKee, Inc. (CDM) certified that the remedy was constructed according to all approved plans and specifications, as documented in the Revised Construction Quality Assurance Closeout Report, prepared by CDM, dated February 1998.

#### **4.2.2 OU-2**

As noted in the previous section, OU-2 did not require remedy implementation, since the concentrations of residual contamination in source area soils following implementation of the OU-1 remedy were below cleanup levels.

#### **4.2.3 OU-3**

The remedial design/remedial action activities for OU-3 are currently underway and are being performed by W. R. Grace under the 1980 Consent Decree. The response activities and deliverables that W. R. Grace is obligated to perform or prepare are described in the Remedial Design/Remedial Action (RD/RA) Statement of Work (SOW), approved on August 30, 2006.

### **4.3 SYSTEM OPERATIONS/O&M**

The Post-Closure Operation & Maintenance Plan ("O&M Plan") (CDM, 1996) forms the basis for operation, maintenance, and monitoring of the Industrial Landfill through the year 2028. This plan applies to the physical maintenance of fencing/security systems, roadways, drainage systems, and the Industrial Landfill final cover and gas control systems. Operation and maintenance of the ARS, onsite monitoring wells, and groundwater monitoring are described in separate documents, including Amended Monitoring Plan - ARS Treatment System (approved October 22, 1996) and Revisions to the Groundwater Monitoring Programs (HSI Geotrans, March 9, 1999).

#### **4.3.1 Industrial Landfill**

Inspections are designed to evaluate the Site for signs of deterioration, malfunction, or improper operation of various systems. Site inspections are currently performed on a quarterly basis and documented on Inspection Log forms that are included in Progress Reports to EPA and MassDEP. Details regarding various inspection/O&M requirements are noted below.

**Fencing, Security Systems, and Benchmarks.** During each inspection, the entire Industrial Landfill perimeter fence must be inspected and the gate locks must be checked. Any breaches are documented and repaired immediately. Missing signage is also noted and replaced.

Permanent benchmarks are inspected annually for signs of damage or deterioration. Maintenance may include replacing damaged or missing benchmarks, or conducting a survey to verify a benchmark elevation.

**Roadways.** The site roadways (not including paved roadways) are inspected regularly for signs of deterioration, poor drainage, and debris. Any deficiencies noted are given corrective attention as soon as possible. Routine maintenance includes clearing, filling, and regrading. Provisions are made for snow removal during the winter season, as needed.

**Drainage Systems.** Drainage swales and culverts associated with the Industrial Landfill are checked for proper operation, particularly after storm events including checking for the presence of excess debris and obstructions at inlet structures, obstructions in culverts and stormwater drain pipes, and areas where vegetative stress and scouring are present. Routine maintenance involves clearing accumulated debris and as-needed repair of undermining and/or cracking at headwalls. Additional operation & maintenance options are assessed for the Industrial Landfill, i.e., more frequent removal of weeds and grass clippings from the swales and/or improvements to the drainage system.

**Industrial Landfill Cover.** Inspection of the capped Industrial Landfill focuses on the following:

- Identification of eroded areas, vegetation deterioration or excessive growth;
- Evidence of ponded water on landfill top indicating landfill settlement;
- Side slope cover material slippage, depressions, or other signs of problems on side slopes;
- Evidence of leachate seepage;
- Rodent holes, animal burrows and mounds;
- Disturbance and damage to site facilities, including landfill gas vents;
- Cracks and ripples; and
- Odors.

Observed deficiencies are recorded. Corrective actions may include filling ruts and gullies in eroded areas and minor regrading. Any major repairs require a plan approved by EPA and MassDEP. Mowing and vegetation improvement (e.g., reseeding and fertilizer addition) are performed as necessary. Annual elevation surveys are conducted until the average of all settlement grid monitoring locations is less than 0.1 feet.

**Landfill Gas Control.** Following approximately 4 years of active landfill gas extraction and treatment via thermal oxidation, it was determined that system shutdown (change to passive venting only) would not cause an unacceptable health risk; however, as noted in the concurrence by EPA and MassDEP (USEPA, 2002), the thermal oxidation unit and all associated piping and equipment were to remain in place and be maintained in an operational and functional condition. The purpose of maintaining this equipment was to allow for it to be activated again, should the long-term air quality monitoring program (recently completed) detect an unacceptable health risk. The most recent monitoring results are presented in Section 6.3.1 and confirm that passive venting is not causing an unacceptable health risk (Sullivan DCM, 2007). Based on that conclusion, W.R. Grace made a request to remove the thermal oxidation unit from the site. EPA and MassDEP are considering the request.

Gas extraction wells/vents, both those designed to be active and passive, are visually examined during inspections. Severely damaged wells will require excavation of the well base to check the integrity of the liner welds. If welds are broken or the geo-membrane is torn, the damage must be repaired.

#### **4.3.2 Aquifer Restoration System**

The ARS was designed to mitigate the migration of contaminated groundwater to the Assabet wells, the Assabet River, and Fort Pond Brook, and to accelerate the removal of contaminants from the groundwater to restore the aquifer as required by the 1980 Consent Decree. At its peak, the ARS consisted of eleven extraction wells: wells SLGP and SLBR near the Primary and Emergency Lagoons; wells NLGP and NLBR near the Tank Car Area; well NMGP near the North Lagoon; wells ELF, MLF,

RLF, and WLF downgradient of the Industrial Landfill; and well RP-1 and former W.R. Grace production well WRG-1 located north of Muskrat Pond.

Groundwater from the extraction wells is treated by air stripping, with carbon filters to control vapors and odors. The treated water is discharged to Sinking Pond. Water from RP-1 was treated in a small air stripper then discharged into well WRG-1. Groundwater pumped from WRG-1 was not contaminated but was pumped and discharged with treated ARS effluent to Sinking Pond to help create a groundwater flow barrier to divert contaminants away from the Assabet well field (HSI GeoTrans, 1998).

In late 2002, prior to the last Five-Year Review, ARS wells WRG-1, RP-1, and NMGP were taken off-line due to leaks from underground piping. After evaluation of possible ramifications of leaving these wells off-line, EPA and MassDEP approved their permanent deactivation. The ongoing annual groundwater monitoring has shown no significant adverse effects on contaminant migration in response to deactivation of these three wells.

In June 2007, the pump in well RLF became inoperable due to problems in the electric line to the well. On September 26, 2007, W.R. Grace petitioned EPA and MassDEP for permission to leave RLF off-line permanently, citing the fact that RLF and ELF were scheduled to be deactivated just prior to the activation of two new extraction wells (SWLF-1 and SELF-1) in the Landfill Area. On January 15, 2008, EPA and MassDEP granted permission to leave RLF off line, but required that ELF remain in operation until the new recovery wells were brought on line. By July 2008, the two new extraction wells in the Landfill Area were constructed and equipped with new pumps. The two existing extraction wells (MLF and WLF) in the Landfill Area that are required to continue in operation under the 2005 ROD were redeveloped. All four Landfill Area extraction wells are now piped to a 550-gallon equalization tank housed in a large steel shipping container near the landfill. A transfer pump connects the equalization tank to the existing ARS groundwater treatment facility.

After shutdown of all four Landfill Area extraction wells to allow water levels to stabilize, a pumping test was conducted with all four wells pumping at a combined rate of about 52 gpm. Water levels in monitoring wells in the Landfill Area were measured during the pumping test and during the recovery phase after the pumps were shut down. Following the pumping and recovery testing in late August and early September 2008, the four well pumps were restarted for continuous operation.

On November 17, 2008, W.R. Grace requested approval to discontinue groundwater extraction from ARS wells NLBR-R, NLGP, SLBR, and SLGP-R. SLBR and SLGP-R had stopped operating in late October due to a damaged pump, motor, and drop cable in SLGP-R. On January 9, 2009, EPA and MassDEP conditionally approved the petition to discontinue pumping from these four wells. Wells NLBR-R and NLGP were left in operation for a time after the conditional approval was granted, to allow for modifications to the air stripper fan to maintain the correct air/water ratio. These wells have since been shut down, so only the four Landfill Area extraction wells remain in operation.

**ARS Performance.** During the period covered by this Five-Year Review, annual ARS Operations Reports have been submitted to provide information related to operation and maintenance (O&M) of the ARS (e.g., permit sampling, extraction well O&M, and air stripping tower O&M). The performance of the ARS in terms of creation of capture zones and remediation of groundwater contamination was evaluated during the remedial investigation and will continue to be monitored through the groundwater level and groundwater quality monitoring results that are presented in the annual Monitoring Program Reports submitted by W.R. Grace.

The hydraulic performance of the ARS system is monitored through weekly checks of the pump operation and the tower influent flow. On a monthly basis, flow rates, discharge pressures, and pumping well water levels are recorded, and the hydraulic connection between Muskrat and Turtle Ponds is monitored and maintained as necessary. In addition to these scheduled monitoring activities, the ARS system is checked in response to dial out calls for such conditions as low flow or low pressure to the stripping tower, power failures, or well pump failures.

The performance of the ARS treatment system is monitored through the collection, on a quarterly basis, of one stripping tower inlet sample; one stripping tower effluent sample; and two surface water samples from the inlet to Sinking Pond where the effluent is discharged. The tower inlet and effluent samples are analyzed for VOCs (Method Low Level 8360B) and dissolved metals (Method 200.7). One of the surface water samples is analyzed for dissolved metals, and the other is analyzed for color/turbidity (Method 180.1/110.2). The sampling program is conducted in accordance with the ARS Amended Monitoring Plan – ARS Treatment System, approved by MassDEP on October 22, 1996. Results from the treatment system monitoring are presented in the Data Review (Section 6.3) portion of this report.

**System Maintenance Activities.** Standard system O&M activities have been performed over the past five years. For example, in 2008, the last year for which an annual report is available, the stripping tower packing was cleaned two times (April and September) with 30% hydrogen peroxide. The activated carbon canisters were also replaced twice, in April and November. Once or twice in 2008, the pump, motor, discharge pipe, and check valve were removed from each extraction well and steam cleaned. Worn or inoperative components were replaced. Before reinstalling the pump, the wells were surged with a surge block and then pumped with a portable submersible pump to remove any sediment or debris loosened by the surging.

#### **4.3.3 Operation and Maintenance Costs**

Grace spends approximately \$200,000 per year on O&M related activities.



## **SECTION 5.0 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW**

The 2004 five-year review (USEPA, 2004) concluded that the remedy for OU-1 was protective of human health and the environment, but that in order for the remedy at OU-1 to be protective in the long-term, it might be necessary to establish additional institutional controls that would be enforceable in the future.

The 2004 five-year review did not include a protectiveness statement for OU-2 because it was determined that a remedy for OU-2 was not needed.

With respect to OU-3, at the time of the 2004 five-year review the remedy for OU-3 had not yet been determined, but the RI/FS process was underway. At that time, groundwater was being extracted and treated by the Aquifer Restoration System (ARS) that was constructed by W. R. Grace in 1985, prior to the ROD for OU-1 which was signed in 1989. At that time, the Acton Water District was providing treatment of groundwater from the five public water supply wells in the vicinity of the Site, as is still being done today. In addition, at that time the Acton Board of Health had established an administrative hold on the installation of private wells within 500 feet of the groundwater contaminant plume, a hold that continues to the present. Hence, exposure pathways that could result in unacceptable risks to humans were being controlled, while the RI/FS process for OU-3 was ongoing.

Overall, the 2004 Five-Year Review concluded that the remedial actions at all Operable Units were either protective or would be protective upon selection and completion, and in the interim, all exposure pathways that could result in unacceptable risks were being controlled.

The following recommendation was made in the 2004 Five-Year Review report.

- Evaluate options for enforceable institutional controls and implement at the Industrial Landfill.

Institutional controls are necessary to regulate land use of the Industrial Landfill, including activities which may compromise the integrity of the cap. These controls would supplement the requirements of the 1980 Consent Decree, which required W. R. Grace to file a notice with the Registry of Deeds, and also requires W. R. Grace to obtain the consent of the United States before transferring ownership of Site property. W. R. Grace has filed the notice with the Registry of Deeds. However, because a deed notice is an informational device that is potentially non-enforceable (USEPA, 2000), an enforceable institutional control would provide greater long-term protection.

Since the 2004 Five-Year Review, EPA has included a requirement for additional institutional controls for the Industrial Landfill and for groundwater, in the 2005 ROD. In August 2006, an agreement was reached with W. R. Grace on an RD/RA Statement of Work to implement the 2005 ROD. Under this SOW, W. R. Grace is required to prepare, submit, and implement an Institutional Control Plan that would provide institutional controls beyond what is currently in place, including additional controls for the Industrial Landfill. Although work is currently ongoing under this SOW, the Institutional Control Plan has not yet been submitted. There were no other recommendations or issues identified in the 2004 Five-Year Review that have been carried over to this review.

## **SECTION 6.0 FIVE-YEAR REVIEW PROCESS**

This section describes the activities performed during the Five-Year Review process and provides a summary of findings. The W. R. Grace Five-Year Review team was led by Derrick Golden of EPA, Remedial Project Manager for the Site. Jennifer McWeeney of MassDEP assisted in the review as the representative for the support agency. The team included staff from Metcalf & Eddy, Inc. with expertise in hydrogeology and risk assessment.

### **6.1 COMMUNITY NOTIFICATION AND INVOLVEMENT**

On July 9, 2009, a public notice was published in the local newspaper, The Beacon, announcing that the Five-Year Review was underway. The final Five-Year Review report will be provided to all Acton stakeholders and the Acton Library, and a public notice will be issued to announce its availability.

### **6.2 DOCUMENT REVIEW**

This Five-Year Review included a review of the documents listed below.

- Second Five-Year Review (09/04)
- Public Review Draft Public Health Risk Assessment, W.R. Grace & Co. OU-3 (7/05)
- Public Review Draft Baseline Ecological Risk Assessment, W.R. Grace & Co. OU-3 (7/05)
- ROD for OU-3 (9/30/05)
- November 2007 Landfill Gas Emission Monitoring Data Report (1/08)
- Annual Aquifer Restoration System Operations Reports (2006, 2007, and 2008)
- Annual OU-3 Monitoring Program Reports (2004-2008)
- Annual Post Closure O&M Report (7/08)

Documents reviewed in the 2004 five-year review include the following:

- Risk Assessment of the W.R. Grace Site by prepared by CDM for W.R. Grace (8/31/88)
- Risk Analysis of the W.R. Grace Site prepared by Alliance Technologies for EPA (6/30/89)
- ROD for OU-1 (9/29/89)
- Post-Closure O&M Plan (8/15/96)/Response to Comments (11/8/96)
- Remedial Action Report (9/30/97)
- Revised Construction Quality Assurance Closeout Report (2/98)
- Proposed Revision of Groundwater Monitoring Programs (3/9/99)
- Phase I Remedial Investigation Work Plan (5/14/99)
- 5-Year Review (9/29/99)
- Flow Measurements of Passive Perimeter Wells and Proposed Monitoring of Landfill Gas Emissions (May 2001)
- Landfill Gas Emission Monitoring and Request to Begin Passive Operation (August 2001)
- March 2004 Landfill Gas Emission Monitoring (4/04)

Complete references are provided in Attachment 2.

## 6.3 DATA REVIEW

In the last five years, the only data collection that is related exclusively to the post-closure period of OU-1 has been air and landfill gas sampling at the Industrial Landfill and the ARS treatment system monitoring. The groundwater level and groundwater quality data, while related to ARS operation and OU-1, have been used extensively in the OU-3 RI/FS process to evaluate the extent of groundwater contamination and to design modifications to the ARS. Brief reviews of each of these sets of data are presented below.

### 6.3.1 Landfill Gas at the Industrial Landfill

Active operation of the landfill gas collection and treatment system occurred at the Industrial Landfill until Fall 2002. Studies performed in 2001 provided results which determined that passive venting would not cause an unacceptable health risk. Quarterly air quality monitoring was performed until September 2004, after which the monitoring frequency changed to annual. The final monitoring event took place in November 2007. All of these events were performed to evaluate if there is any change in the studies' conclusions regarding passive venting.

The most recent set of monitoring data collected (November 2007) indicates that the maximum impacts of landfill emissions during passive operation (determined via stack monitoring and air dispersion modeling) are significantly below the Massachusetts 24-hour Threshold Effects Exposure Limits (TELs) and Allowable Ambient Limits (AALs) for each of the six target compounds associated with the system (see Table 2) (Sullivan DCM, 2007). Therefore, the data support the continued passive operation of the landfill gas system and will be used to evaluate W. R. Grace's request to remove the thermal oxidation unit from the Site.

**Table 2. Ambient Impacts Summary**

Pollutant	24-hour Impact (ug/m <sup>3</sup> )	24-hour TEL (ug/m <sup>3</sup> )	Percent of TEL	Annual Impact (ug/m <sup>3</sup> )	Annual AAL (ug/m <sup>3</sup> )	Percent of AAL
Ethylbenzene	0.0618	300	0.02%	0.01	300	0.00%
Vinyl chloride	0.0396	3.47	1.14%	0.005	0.38	1.25%
Xylenes	0.1226	11.8	1.04%	0.015	11.8	0.12%
Benzene	0.0480	1.74	2.76%	0.006	0.12	4.80%
Toluene	0.0560	80	0.07%	0.007	20	0.03%
1,1-Dichloroethene	0.0595	215.62	0.03%	0.007	107.81	0.01%

### 6.3.2 ARS Operations Monitoring

The performance of the ARS treatment system is monitored through the collection, on a quarterly basis, of one stripping tower influent sample; one stripping tower effluent sample; and two surface water samples from the inlet to Sinking Pond where the effluent is discharged. The tower influent and effluent samples are analyzed for VOCs (Method Low Level 8360B) and dissolved metals (Method 200.7). One of the surface water samples is analyzed for dissolved metals, and the other is analyzed for color/turbidity

(Method 180.1/110.2). The sampling program is conducted in accordance with the ARS Amended Monitoring Plan – ARS Treatment System, approved by MassDEP on October 22, 1996.

According to the most recent three years of ARS operations reports (for 2006, 2007, and 2008), no VOCs have been detected in the tower effluent at concentrations that exceed MCLs. In 2008, the last year for which an annual report is available, the tower influent concentrations in the four quarterly samples ranged from 24 to 50 µg/L for VDC, from 0.42J to 12 µg/L for benzene, and from 1.7J to 8.1 µg/L for VC. The tower effluent concentrations ranged from <1.0 to 2.2 µg/L for VDC and were all <1.0 µg/L for benzene and VC.

Unlike the VOCs, some of the measured concentrations of two inorganic parameters (iron and arsenic) in both the tower effluent and Sinking Pond inlet samples were found to exceed MCLs in the period from 2006 to 2008. (Note that in the ARS Operations Reports, the MCL/Groundwater Standard for arsenic is based upon the old standard of 50 µg/L rather than the current MCL of 10 µg/L.) In the twelve quarterly rounds of sampling conducted from 2006 to 2008, iron exceeded the evaluation criterion of 300 µg/L in eight of the tower effluent samples and in eleven of the Sinking Pond inlet samples. In 2008, the last year for which an annual report is available, the concentrations of iron in the tower effluent exceeded the Amended Monitoring Plan limit in two of the four quarterly samples, and the iron concentrations in the Sinking Pond inlet exceeded the limit in three of the four quarterly samples. In June 2008, when the iron concentration in the tower effluent was <100 µg/L, the concentration in the inlet was 3,850 µg/L. Concentrations of arsenic ranged from 15.9 to 45.7 µg/L in the tower influent; from <1.0 to 30.5 µg/L in the tower effluent; and from 1.4 to 17.7 µg/L in the pond inlet.

Color in the inlet samples in 2008 ranged from 30 to 1,000 units. Turbidity ranged from 30.1 to 312 NTU.

The OU-3 remedial design activities include the design of a new groundwater treatment system (with metals removal) and updated discharge standards.

### **6.3.3 Groundwater Monitoring**

The OU-3 RI/FS resulted in the installation and sampling of numerous new monitoring wells to better define the nature and extent of the groundwater contamination at the Site. This new information, combined with the data from the samples that are collected for the regular annual monitoring program, was used to evaluate groundwater conditions after about 20 years of ARS operation and to formulate a groundwater remedy for OU-3. A detailed discussion of groundwater data is not included here because OU-3 is not being evaluated as part of this Five-Year Review.

## **6.4 SITE INSPECTION**

A site inspection of the Industrial Landfill was conducted on June 18, 2009. Representatives from EPA, AECOM/Metcalf & Eddy, Inc. (EPA contractor), Remedium (W.R. Grace subsidiary) and MassDEP participated in the inspection. The purpose of the inspection was to help assess the protectiveness of the OU-1 remedy by observing the condition of the landfill fence, the landfill cover and drainage system, and the landfill gas passive vent system. The site inspection checklist and photos are included in Attachment 3.

Several minor issues were noted during the site inspection. There was standing water in several locations in the rip-rapped perimeter drainage swale around the landfill. Standing water in the perimeter swale on the south, southeast, and northwest areas appears to either be the result of sedimentation adjacent to and directly below the rip-rap downchutes just downstream of the standing water, or the result of localized settling. Accumulation of vegetation clippings from previous mowing may be contributing to the build-up in these areas also. A groundhog burrow was observed on the top of the landfill. Several of the polyethylene manhole covers on the landfill are missing the “Keep Out” signs that were previously attached. The plastic signs have degraded over time and many have broken into pieces. Note, however,

that there is no evidence of trespassers at the landfill, and all manholes observed were locked.

## **6.5 INTERVIEWS**

A series of interview questions was developed based on suggested questions in the EPA guidance for five-year reviews (USEPA, 2001). Questions were tailored to the role of the particular respondent, but several general questions were asked of all respondents, including:

1. What was the respondents' overall impression of the project to date;
2. If the respondent was aware of any community concerns regarding the Site;
3. Did the respondent feel well-informed about the Site and Site activities;
4. Did the respondent have any comments, suggestions, or recommendations regarding the Site's management or operation.

A list of interviewees was developed that included representatives of the Towns of Acton and Concord, the citizens' group Acton Citizens for Environmental Safety, and W. R. Grace. The following individuals were interviewed by telephone:

Doug Halley, Health Director, Town of Acton  
Matt Mostoller, Environmental Manager, Acton Water District  
Mary Michelman, President, Acton Citizens for Environmental Safety (ACES)  
Brent Reagor, Public Health Director, Town of Concord  
Jennifer McWeeney, MassDEP – Project Manager representing MassDEP for oversight of the Site

The following individuals were interviewed in conjunction with the site inspection performed on June 18, 2009 with a follow-up call held on June 22, 2009:

Maryellen Johns, Remedium - Project Manager representing W. R. Grace for the Site

A record of each interview was produced and has been included in this report as Attachment 4.

## **SECTION 7.0 TECHNICAL ASSESSMENT**

This section discusses the technical assessment of the remedy and provides answers to the three questions posed in the EPA Guidance (USEPA, 2001).

### **7.1 QUESTION A: IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENTS? - YES**

The review of documents indicates that the OU-1 remedy was implemented in accordance with the ROD for OU-1. O&M of the Industrial Landfill cap and associated drainage structures have generally been effective. However, during the June inspection there was standing water in several locations in the rip-rapped perimeter drainage swale around the landfill. Standing water in the perimeter swale on the south, southeast, and northwest areas appears to either be the result of sedimentation adjacent to and directly below the rip-rap downchutes just downstream of the standing water, or the result of localized settling. Accumulation of vegetation clippings from previous mowing may be contributing to the build-up in these areas also. Some additional minor landfill O&M issues were identified during the site inspection (see Section 6.4) but they do not impede the effectiveness of the remedy. The passive venting of landfill gas at the Industrial Landfill does not result in air contaminant levels in excess of Massachusetts 24-hour Threshold Effects Exposure Limits (TEELs) and Allowable Ambient Limits (AALs) for each of the six target compounds associated with the system.

The Industrial Landfill is owned and maintained by W.R. Grace, access is restricted by a fence, and a deed notice has been filed with the Registry of Deeds that puts parties on notice that the landfill cannot be disturbed except by written permission of MassDEP, and hence there is no current potential for exposure to waste left in place under the landfill cap. The fence surrounding the landfill is intact and kept in good repair. W.R. Grace has stated that it intends to maintain ownership of the land surrounding the Industrial Landfill, and control access to it.

The ARS air stripping tower appears to be well-maintained and performing properly in the removal of organics. However, there have been exceedances of discharge criteria for inorganics because the current treatment system is not designed for removal of inorganics. This issue is being addressed by the OU-3 remedy and a new treatment system is currently being designed by W.R. Grace in accordance with the RD/RA SOW.

Extraction wells which are part of the ARS have required frequent maintenance due to iron fouling. A number of wells that are not part of the OU-3 remedy have been taken out of operation because of underground piping breaks and pump failures. The remedy for OU-3 requires a re-design of the extraction system, which is currently underway. Two new extraction wells have been installed and are currently in operation, along with two of the original ARS extraction wells.

### **7.2 QUESTION B: ARE THE EXPOSURE ASSUMPTIONS, TOXICITY DATA, CLEANUP LEVELS, AND REMEDIAL ACTION OBJECTIVES (RAOs) USED AT THE TIME OF REMEDY SELECTION STILL VALID? - YES**

Question B is addressed by reviewing the human health and ecological risk assessments that formed the basis for the OU-1 remedy, describing any significant differences as compared to current risk assessment practice, and qualitatively evaluating the impact of any such differences on remedy protectiveness.

### **7.2.1 Review of the Human Health Risk Assessments and Toxicity Factors Serving as the Basis for the Remedy**

The risk assessment conducted for OU-1 (Alliance, 1989) evaluated the risks and hazards associated with the ingestion of groundwater for the entire Site and for direct contact with and ingestion of surface soil for: (1) the entire Site considered as a single source; and (2) the individual source areas. The primary risks and hazards observed in this analysis were those associated with ingestion of contaminated groundwater by a small child and adult/youth. The primary risk contributors for the groundwater ingestion pathway were 1,1-dichloroethene (VDC), vinyl chloride (VC), arsenic, lead, and zinc. The risks and hazards associated with incidental ingestion of and dermal contact with surface soil were less significant than those estimated for groundwater ingestion. However, elevated risks and hazards for soil exposures were attributable to VDC, VC, and arsenic.

EPA established soil cleanup goals for five indicator chemicals (VDC, VC, ethylbenzene, benzene, and bis(2-ethylhexyl)phthalate) listed in Table 3 of the OU-1 ROD. The attainment of cleanup goals for these five chemicals was expected to reduce residual contamination of other compounds found at the Site to such low levels as to present no significant risk from direct contact or from migration of contaminants to groundwater. The indicator chemicals selected also included compounds identified in underlying soils that could contribute to risk following leaching to groundwater. The soil cleanup goals were generated based on a model that calculated the level of the indicator chemical which, if left in soil as a residual, would not lead to further contamination of groundwater at levels that exceed drinking water standards (i.e., MCLs). A number of additional chemicals were identified as soil and groundwater “indicator chemicals”, as listed in Table 1 of the OU-1 ROD.

In this Five-Year Review report, the toxicity values that served as the basis for the soil cleanup levels, as contained in the OU-1 ROD, as well as the toxicity values used for the “indicator compounds,” have been re-evaluated to determine whether any changes in toxicity impact the protectiveness of the remedy. Any changes in current or potential future exposure pathways or exposure assumptions that may impact remedy protectiveness are also noted. In addition, environmental data, available since the last five-year review, have been qualitatively evaluated to determine whether exposure levels existing at the Site present a risk to current human receptors.

#### **Changes in Toxicity**

Table 3 presents the changes in toxicity values (oral reference doses and oral cancer slope factors) for compounds for which soil cleanup levels were developed as well as compounds selected as “indicator chemicals” in 1989. Updated toxicity information was obtained from the Integrated Risk Information System (IRIS; USEPA, 2009b) and other current EPA sources (e.g., the Superfund Technical Support Center).

For most contaminants, changes to toxicity information have been minimal and primarily reflect decreases in toxicity (e.g., VDC and toluene), though some compounds are now believed to have greater toxicity than thought in 1989 (e.g., arsenic and benzene).

**TABLE 3. COMPARISON OF 1989/2005 AND 2009 ORAL REFERENCE DOSES AND ORAL  
CANCER SLOPE FACTORS FOR COMPOUNDS OF POTENTIAL CONCERN  
W.R. GRACE SUPERFUND SITE, ACTON, MASSACHUSETTS**

Contaminant of Potential Concern	Oral Reference Dose (RfD) (mg/kg-day)			Oral Slope Factor (SF) (mg/kg-day) <sup>-1</sup>		
	1989	2005	2009	1989	2005	2009
1,1-Dichloroethene	0.009	0.05	0.05	0.6	N/A	N/A
Benzene	N/A	0.004	0.004	0.029	0.055	0.055
Ethylbenzene	0.1	0.1	0.1	N/A	N/A	0.011
Toluene	0.3	NE	0.08	N/A	NE	N/A
Trichloroethene	0.007	0.0003	N/A	0.011	0.4	0.013
Vinyl chloride	N/A	0.003	0.003	2.3	0.75	0.72
bis(2-ethylhexyl)phthalate	NE	0.02	0.02	NE	0.014	0.014
Arsenic	0.001	0.0003	0.0003	15	1.5	1.5
Beryllium	0.0005	0.002	0.002	N/A	N/A	N/A
Cadmium (food)	0.0005	0.001	0.001	N/A	N/A	N/A
Cadmium (water)	0.0005	0.0005	0.0005	N/A	N/A	N/A
Chromium (as VI)	0.005	0.003	0.003	N/A	N/A	N/A
Copper	0.037	NE	0.04	N/A	NE	N/A
Lead (a)	0.0014	N/A	N/A	N/A	N/A	N/A
Nickel	0.02	0.02	0.02	N/A	N/A	N/A
Zinc	0.2	NE	0.3	N/A	NE	N/A

N/A = Not Applicable or Not Available

NE = Not evaluated as a COPC

(a) Lead is currently evaluated through the use of exposure modeling for adults and children.



Soil contaminants requiring cleanup were selected based on direct contact risk contributors identified in the 1989 risk analysis and on the potential of soil contaminants to leach to groundwater. To assure that the soil cleanup goals for the selected indicator compounds in soil do not present a direct contact risk using current toxicity information, a comparison of the soil cleanup goals to residential soil screening levels (USEPA, 2009a) has been performed. The residential soil screening levels are developed based on current toxicity information and correspond to a carcinogenic risk of  $1 \times 10^{-6}$  and a non-carcinogenic hazard of 1. All soil cleanup levels are below the risk-based screening level except for the highest cleanup level developed for VC at the Secondary Lagoon. However, the highest cleanup level for VC only slightly exceeds the screening level set at a cancer risk of  $1 \times 10^{-6}$ . Therefore, this comparison indicates that the soil cleanup levels would not be associated with a cumulative cancer risk and non-cancer hazard greater than EPA's risk management criteria and the soil cleanup levels remain adequately protective for future residential land use.

**Table 4. Comparison of ROD Soil Cleanup Levels to Risk-Based Screening Levels**

<b>Pollutant</b>	<b>Low Range of Soil Cleanup Level (ug/kg)</b>	<b>High Range of Cleanup Level (ug/kg)</b>	<b>Risk-Based Screening Level (ug/kg)</b>
Ethylbenzene	619	4914	5,700
Vinyl chloride	9	75	60
Benzene	1	7	1,100
Bis(2-ethylhexyl)phthalate	61	491	35,000
1,1-Dichloroethene	8	65	250,000

#### **Changes in Exposure Pathways/Assumptions**

There have been no changes in land use since the last Five-Year Review. The W.R. Grace property continues to be vacant and partially fenced, preventing exposures to remaining contamination except for the possible occasional trespasser. The human health risk assessment for OU-3 completed in 2005 (Menzie-Cura and Associates, Inc, July 2005) evaluated current exposures such as trespassing and concluded that there was no significant risk from current exposures to sediment. In any case, efforts to prevent trespassing at the Site should continue. With respect to groundwater use, the Town provides treated water for use in the community and the Acton Board of Health has an administrative hold in issuing permits for private irrigation wells within the plume area.

Though the vapor intrusion pathway from groundwater to indoor air was evaluated in the 2005 risk assessment and was determined to be associated with negligible risk, this pathway may require further consideration in the future as methods used to evaluate this complex pathway evolve. However, the potential for vapor intrusion should decrease as groundwater cleanup progresses.

Starting in 2006, groundwater samples were collected for analysis of 1,4-dioxane to determine if this compound, historically used as a stabilizer in some solvents, is present at the Site. It has been detected at relatively low concentrations downgradient of the landfill (maximum of 36 ug/L). Monitoring for 1,4-dioxane will continue as part of the annual program. 1,4-Dioxane was not included in the 2005 vapor intrusion evaluation. However, because 1,4-dioxane does not readily volatilize from groundwater and does not meet EPA's definition of a volatile compound, the lack of inclusion of this compound does not affect the conclusions of the 2005 vapor intrusion evaluation.

A new method to evaluate compounds with mutagenic modes of action such as vinyl chloride and the carcinogenic PAHs is now recommended by EPA. The current methodology calls for the use of age-specific adjustment factors to account for an increased sensitivity during early life. Based on the extent of soil clean-up performed, it is likely that PAHs are present in soils at levels consistent with background concentrations.

### Evaluation of Recent Sampling Data

Emissions from the Industrial Landfill were not evaluated in the 1989 risk assessment, but have been evaluated since then to support the change from an active landfill gas collection and treatment system to passive venting. Air dispersion modeling was performed most recently on November 2007 landfill gas emission data for six target compounds to estimate exposure concentrations during passive venting. These exposure concentrations were shown in Table 2 to be below the Massachusetts 24-hour TELs and AALs. However, AALs and TELs were last updated in 1995 and may be toxicologically outdated. Therefore, the modeled air concentrations are compared in the following table to risk-based screening levels (USEPA, 2009a), protective of continuous exposures to the most sensitive receptor populations and based on the most up-to-date toxicity information available. The target risk levels for the screening levels are a noncarcinogenic hazard quotient of 1 and an incremental lifetime cancer risk of  $1 \times 10^{-6}$ . Because the modeled air concentrations are significantly below the risk-based screening levels, the landfill emissions do not cause an unacceptable human health risk or hazard.

**Table 5. Comparison of Modeled Air Concentrations to Risk-Based Screening Levels**

Pollutant	24-hour Impact (ug/m <sup>3</sup> )	Annual Impact (ug/m <sup>3</sup> )	Risk-Based Screening Level (ug/m <sup>3</sup> )
Ethylbenzene	0.0618	0.01	0.97
Vinyl chloride	0.0396	0.005	0.16
Xylenes	0.1226	0.015	100
Benzene	0.0480	0.006	0.31
Toluene	0.0560	0.007	5200
1,1-Dichloroethene	0.0595	0.007	210

According to the most recent three years of ARS operations reports, tower effluent concentrations ranged from non-detect to 2.2 ug/L for 1,1-dichloroethene and were non-detect for benzene and vinyl chloride. Concentrations of arsenic ranged from 1.4 to 17.7 ug/L in the pond inlet. The 2005 risk assessment indicated a negligible risk to future recreational users of the pond based on comparable contaminant concentrations in surface water, so potential exposure to surface water contaminants is not of concern to human health. This conclusion is largely based on the tendency of residual VOCs to disperse and dilute into ambient air and the inability of arsenic to readily cross through the skin and enter the blood stream.

### 7.2.2 Ecological Risk Review

Though soil cleanup levels presented in the ROD for OU-1 were based on human health criteria, they are also protective of ecological receptors. Ecological screening benchmarks for soil (selected from the lowest values of USEPA, 2003; Sample, Opresko, and Suter, 1996; Efroymsen *et al.*, 1997a; Efroymsen, Will, and Suter, 1997b) which did not exist at the time the ROD was written, are currently available for VC, benzene, and bis-2(ethylhexyl)phthalate. The screening values are above the soil cleanup goals

established for OU-1, indicating that cleanup goals for OU-1 are protective of the environment. Furthermore, because remediation involved excavation of the top two to five feet of soil, contaminants were removed from the zone of biological activity.

A Baseline Ecological Risk Assessment (BERA) was completed for OU-3 in 2005 (Menzie-Cura & Associates, Inc., July 2005). In the BERA, risks were identified to semi-aquatic wildlife and benthic invertebrates in sediment from the North Lagoon Wetland and Sinking Pond and additionally to fish in Sinking Pond. There were no unacceptable ecological risks from exposure to surface water.

### **7.2.3 ARARs Review**

EPA has reviewed the Applicable or Relevant and Appropriate Requirements identified in the OU-1 ROD to check for possible impacts on the remedy due to changes in standards.

The tables in Attachment 5 provide an evaluation of ARARs using the regulations and requirement synopses listed in the OU-1 ROD. The evaluation includes a determination of whether the regulation is currently ARAR or TBC and whether the requirements have been met. Most of the regulations and requirements remain ARARs for the site and all are being complied with. Some regulations/requirements that were originally identified as ARARs are in fact either applicable requirements that apply to off-site activities or other laws that must be met at the site (e.g., OSHA).

The Massachusetts Sanitary Landfill Regulations are no longer considered ARAR. They would have been applicable to capping in place of the Battery Separator Area chip piles, which was part of the ROD-specified remedy for OU-1. However, the chip piles were excavated and placed in the Industrial Landfill instead of being capped in place.

### **7.3 QUESTION C: HAS ANY OTHER INFORMATION COME TO LIGHT THAT COULD CALL INTO QUESTION THE PROTECTIVENESS OF THE REMEDY? - NO**

There is no other information that calls into question the protectiveness of the remedy.

### **7.4 TECHNICAL ASSESSMENT SUMMARY**

According to the data reviewed, the site inspection, and the interviews, the OU-1 remedy is functioning as intended by the ROD. Remedial actions for OU-1 have been completed. No remedy for OU-2 was necessary, as residual contamination in soils under the source areas did not exceed soil cleanup goals established for OU-1. The OU-1 soil cleanup goals remain adequately protective for a residential exposure scenario, based on a comparison of the goals to EPA residential soil screening levels (USEPA, 2009a).

To maintain the protectiveness of the OU-1 remedy in the long-term, additional institutional controls for the Industrial Landfill are necessary. The Industrial Landfill is owned and maintained by W.R. Grace, access is restricted by a fence, and a deed notice has been filed with the Registry of Deeds that puts parties on notice that the landfill cannot be disturbed except by written permission of MassDEP. O&M of the Industrial Landfill cap and associated drainage structures have generally been effective. However, during the June inspection there was standing water in several locations in the rip-rapped perimeter drainage swale around the landfill. Standing water in the perimeter swale on the south, southeast, and northwest areas appears to either be the result of sedimentation adjacent to and directly below the rip-rap downchutes just downstream of the standing water, or the result of localized settling. Accumulation of vegetation clippings from previous mowing may be contributing to the build-up in these areas also. Some additional minor landfill O&M issues were identified during the site inspection (see Section 6.4), but they

do not impede the effectiveness of the remedy.

There is no other information that calls into question the protectiveness of the remedy.

## SECTION 8.0 ISSUES

Based on the activities conducted during this Five-Year Review, the issues identified in Table 6 have been noted.

**Table 6: Issues**

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Additional Institutional Controls required for the Industrial Landfill to ensure the protectiveness of the remedy in the future.	N	Y
Assess additional operation & maintenance options, i.e., more frequent removal of weeds and grass clippings from the swales and/or improvements to the drainage system.	N	Y

## SECTION 9.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

In response to the issues noted above, it is recommended that the actions listed in Table 7 be taken:

**Table 7: Recommendations and Follow-up Actions**

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness	
					Current	Future
Additional Institutional Controls required for the Industrial Landfill to ensure the remedy remains protective in the future.	Evaluate options for institutional controls and implement as part of the Institutional Control Plan required under the RD/RA SOW.	W. R. Grace	EPA and MassDEP	Before next Five-Year Review (September 29, 2014)	N	Y
Assess additional operation & maintenance options, i.e., more frequent removal of weeds and grass clippings from the swales and/or improvements to the drainage system.	Assess additional operation & maintenance options with the responsible parties	W. R. Grace	EPA and MassDEP	Before next Five-Year Review (September 29, 2014)	N	Y

## **SECTION 10.0 PROTECTIVENESS STATEMENT**

**OU-1:** This Five-Year Review concludes that the remedy for OU-1 currently protects human health and the environment. Soil in excess of cleanup levels has been excavated, stabilized, and either placed in the Industrial Landfill or shipped off-site for treatment and disposal. The Industrial Landfill was then sealed/closed with an impermeable cap designed and constructed in accordance with Massachusetts Hazardous Waste Regulations for landfills specified at 310 CMR 30.580-595 and 30.620-633. The Industrial Landfill is owned and maintained by W.R. Grace, access is restricted by a fence, and a deed notice has been filed with the Registry of Deeds that puts parties on notice that the landfill cannot be disturbed except by written permission of MassDEP. In order for the remedy at OU-1 to be protective in the long-term, additional institutional controls for the Industrial Landfill should be put in place so that the integrity of the cap is maintained. Additional maintenance is also needed at the Industrial Landfill In order for the remedy at OU-1 to be protective in the long-term.

There is no protectiveness statement for OU-2 because it was determined that a remedy for OU-2 was not needed.

The remedial design/remedial action is currently underway for OU-3. The remedy at OU-3 is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

### **Other Comments**

Groundwater in the vicinity of the Industrial Landfill is currently being extracted and treated by an Aquifer Restoration System (ARS) that was constructed by W. R. Grace in 1985, prior to the 1989 ROD. The groundwater extraction wells and the groundwater treatment equipment and extraction locations that comprise the ARS are being re-designed as required by the 2005 ROD and the new systems are expected to come on line prior to the next Five-Year Review. While the new system is being designed, the current ARS, as modified to accommodate two newly installed extraction wells that will be part of the remedy, will remain in operation. The Acton Water District provides treatment of groundwater from the five public water supply wells in the vicinity of the Site, and the Acton Board of Health has an administrative hold in issuing permits for private irrigation wells within the plume area. Areas of contaminated sediment are located within land owned by W. R. Grace and which is not in use, so there is no current risk to human health from exposure to sediment. In addition, the second five-year review evaluated vapor intrusion as a potential pathway and concluded that the risk from this potential pathway was negligible at the W. R. Grace site. Hence, exposure pathways that could result in unacceptable risks to human health are being controlled, while the Remedial Design/Remedial Action process for OU-3 continues.

## **SECTION 11.0 NEXT REVIEW**

The next Five-Year Review for the W. R. Grace (Acton Plant) Superfund Site will be completed by September 29, 2014, five years from the date of this review. The next Five-Year Review should include:

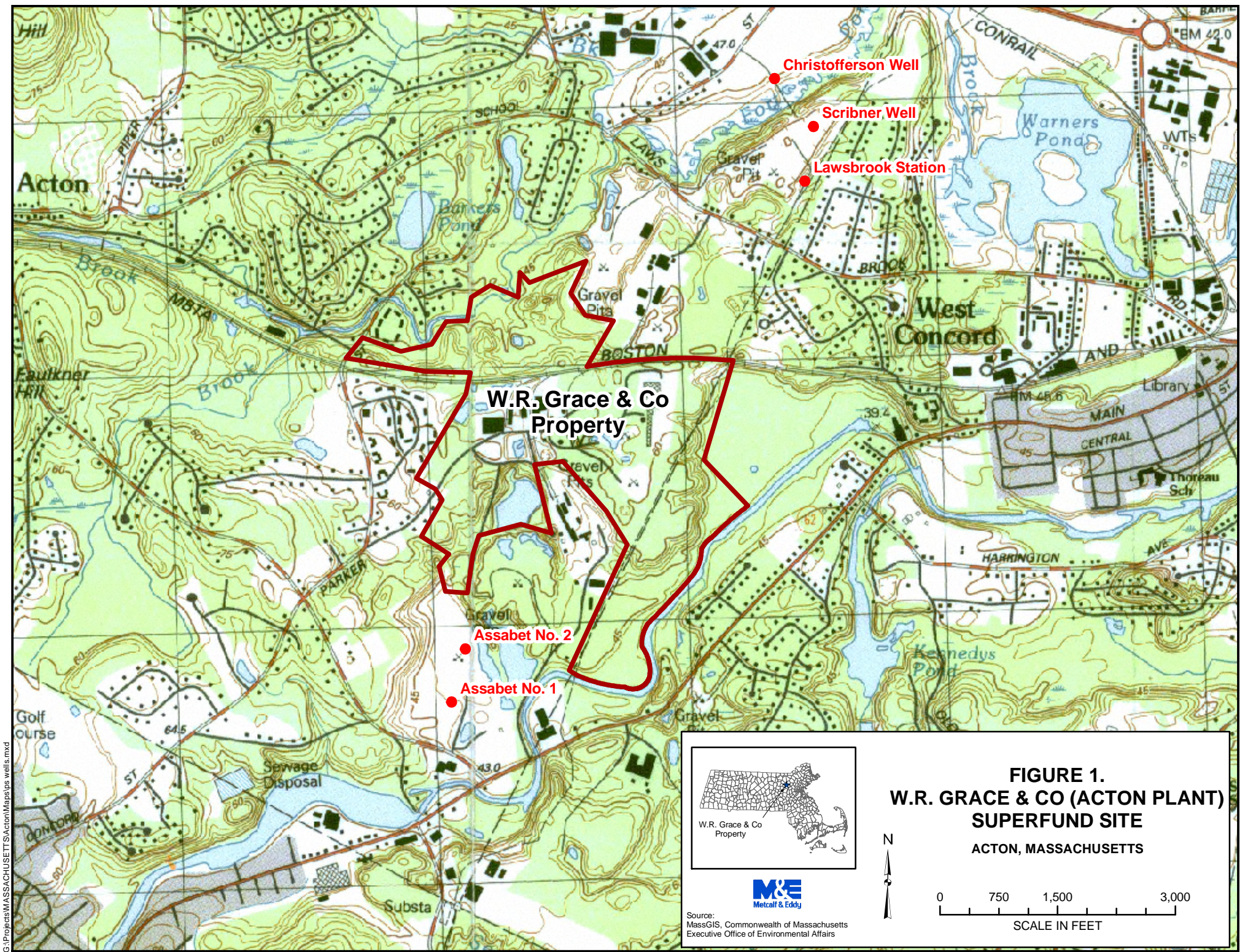
- Review of institutional control status for the Industrial Landfill
- Evaluation of progress towards implementation of the OU-3 remedy
- Review of monitoring data to confirm that the remedial actions are protective of human health and the environment
- Assessment of O & M at Industrial Landfill



**ATTACHMENT 1**

**SITE MAPS**





W.R. Grace & Co  
Property



Source:  
MassGIS, Commonwealth of Massachusetts  
Executive Office of Environmental Affairs



**FIGURE 1.**  
**W.R. GRACE & CO (ACTON PLANT)**  
**SUPERFUND SITE**  
**ACTON, MASSACHUSETTS**

0 750 1,500 3,000  
SCALE IN FEET





## ATTACHMENT 2

### LIST OF DOCUMENTS REVIEWED/REFERENCES

- Alliance Technologies Corporation, 1989. Risk Analysis of the W.R. Grace Site, Acton, Massachusetts. Prepared for U.S. Environmental Protection Agency, Office of Waste Programs Enforcement, Washington, DC, Contract No. 68-W9-0003. June 30, 1989.
- Camp Dresser & McKee. 1984. The Final Report on Aquifer Restoration Program, 3 Volumes, June 1984 (as cited in HSI GeoTrans, 1998).
- Camp Dresser & McKee. 1988. Appendix D Risk Assessment for W..R. Grace Site, Acton, Massachusetts. August 31, 1988.
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**ATTACHMENT 3**

**SITE INSPECTION CHECKLIST AND PHOTOGRAPHS**

## Five-Year Review Site Inspection Checklist

("N/A" refers to "not applicable.")

<b>I. SITE INFORMATION</b>	
<b>Site name:</b> W.R. Grace (Acton Plant) Superfund Site	<b>Date of inspection:</b> June 18, 2009
<b>Location and Region:</b> Acton, MA; Region I	<b>EPA ID:</b> MAD001002252
<b>Agency, office, or company leading the five-year review:</b> USEPA/AECOM (formerly Metcalf & Eddy, Inc.)	<b>Weather/temperature:</b> Overcast/Sprinkles/65-70°F
<b>Remedy Includes:</b> (Check all that apply) <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 45%;"> <input checked="" type="checkbox"/> Landfill cover/containment  <input checked="" type="checkbox"/> Access controls  <input type="checkbox"/> Institutional controls  <input type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input type="checkbox"/> Other _____             </div> <div style="width: 45%;"> <input type="checkbox"/> Monitored natural attenuation  <input type="checkbox"/> Groundwater containment  <input type="checkbox"/> Vertical barrier walls             </div> </div>	
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached	
<b>II. INTERVIEWS</b>	
Interviews were performed by USEPA/AECOM (formerly Metcalf & Eddy, Inc.) and are included separately.	



<b>III. ON-SITE DOCUMENTS &amp; RECORDS VERIFIED</b> (Check all that apply)				
1.	<b>O&amp;M Documents</b> G O&M manual G As-built drawings G Maintenance logs  Remarks: Not reviewed	G Readily available G Readily available G Readily available	G Up to date G Up to date G Up to date	G N/A G N/A G N/A
2.	<b>Site-Specific Health and Safety Plan</b> G Contingency plan/emergency response plan  Remarks: Not reviewed	G Readily available G Readily available	G Up to date G Up to date	G N/A G N/A
3.	<b>O&amp;M and OSHA Training Records</b>  Remarks: Not reviewed	G Readily available	G Up to date	G N/A
4.	<b>Permits and Service Agreements</b> G Air discharge permit G Effluent discharge G Waste disposal, POTW G Other permits _____	G Readily available G Readily available G Readily available G Readily available	G Up to date G Up to date G Up to date G Up to date	X N/A X N/A X N/A X N/A
5.	<b>Gas Generation Records</b>  Remarks: Not reviewed	G Readily available	G Up to date	G N/A
6.	<b>Settlement Monument Records</b>  Remarks: Not reviewed	G Readily available	G Up to date	G N/A
7.	<b>Groundwater Monitoring Records</b>  Remarks: Not reviewed	G Readily available	G Up to date	G N/A
8.	<b>Leachate Extraction Records</b>  Remarks: Not reviewed	G Readily available	G Up to date	G N/A
9.	<b>Discharge Compliance Records</b> G Air G Water (effluent)	G Readily available G Readily available	G Up to date G Up to date	X N/A X N/A
10.	<b>Daily Access/Security Logs</b>  Remarks: Not reviewed	G Readily available	G Up to date	G N/A

IV. O&M COSTS			
1.	<b>O&amp;M Organization</b> G State in-house                      G Contractor for State G PRP in-house                      X Contractor for PRP G Federal Facility in-house        G Contractor for Federal Facility G Other _____ _____		
2.	<b>O&amp;M Cost Records</b>  Not Reviewed		
3.	<b>Unanticipated or Unusually High O&amp;M Costs During Review Period</b> Describe costs and reasons: None noted during review of monthly reports _____ _____ _____ _____ _____ _____		
V. ACCESS AND INSTITUTIONAL CONTROLS    X Applicable    G N/A			
<b>A. Fencing</b>			
1.	<b>Fencing damaged</b> G Location shown on site map                      X Gates secured                      G N/A  Remarks: Fencing appeared to be in good shape.		
<b>B. Other Access Restrictions</b>			
1.	<b>Signs and other security measures</b> G Location shown on site map                      X N/A  Remarks _____ _____		

<b>C. Institutional Controls (ICs)</b>				
1.	<b>Implementation and enforcement</b>			
	Site conditions imply ICs not properly implemented	G Yes	G No	X N/A
	Site conditions imply ICs not being fully enforced	G Yes	G No	X N/A
	Type of monitoring (e.g., self-reporting, drive by) _____			
	Frequency _____			
	Responsible party/agency _____			
	Contact _____	_____	_____	_____
	Name	Title	Date	Phone no.
	Reporting is up-to-date	G Yes	G No	X N/A
	Reports are verified by the lead agency	G Yes	G No	X N/A
	Specific requirements in deed or decision documents have been met	G Yes	G No	X N/A
	Violations have been reported	G Yes	G No	X N/A
	Other problems or suggestions: G Report attached			
	_____			
	_____			
	_____			
2.	<b>Adequacy</b>	G ICs are adequate	G ICs are inadequate	X N/A
	Remarks _____			
	_____			
	_____			
<b>D. General</b>				
1.	<b>Vandalism/trespassing</b>	G Location shown on site map	X No vandalism evident	
	Remarks _____			
	_____			
2.	<b>Land use changes on site</b>	X N/A		
	Remarks _____			
	_____			
3.	<b>Land use changes off site</b>	X N/A		
	Remarks _____			
	_____			
<b>VI. GENERAL SITE CONDITIONS</b>				
<b>A. Roads</b>	X Applicable	G N/A		
1.	<b>Roads damaged</b>	G Location shown on site map	X Roads adequate	G N/A
	Remarks _____			
	_____			

<b>B. Other Site Conditions</b>			
Remarks _____ _____ _____ _____ _____			
<b>VII. LANDFILL COVERS</b> X Applicable    G N/A			
<b>A. Landfill Surface</b>			
1.	<b>Settlement</b> (Low spots) Areal extent _____ Remarks _____	G Location shown on site map Depth _____	X Settlement not evident
2.	<b>Cracks</b> Lengths _____    Widths _____    Depths _____ Remarks _____	G Location shown on site map	X Cracking not evident
3.	<b>Erosion</b> Areal extent _____ Remarks _____	G Location shown on site map Depth _____	X Erosion not evident
4.	<b>Holes</b> Areal extent _____  Remarks: One hole on top of landfill, northeast area. Likely groundhog burrow.	G Location shown on site map Depth _____	G Holes not evident
5.	<b>Vegetative Cover</b> X Grass    X Cover properly established    X No signs of stress G Trees/Shrubs (indicate size and locations on a diagram) Remarks _____		
6.	<b>Alternative Cover (armored rock, concrete, etc.)</b> X N/A Remarks _____		
7.	<b>Bulges</b> Areal extent _____ Remarks _____	G Location shown on site map Height _____	X Bulges not evident

8.	<b>Wet Areas/Water Damage</b> G Wet areas G Ponding G Seeps G Soft subgrade Remarks_____	X Wet areas/water damage not evident G Location shown on site map G Location shown on site map G Location shown on site map G Location shown on site map	Areal extent_____ Areal extent_____ Areal extent_____ Areal extent_____
9.	<b>Slope Instability</b> Areal extent_____ Remarks_____	G Slides G Location shown on site map	X No evidence of slope instability
<b>B. Benches</b> X Applicable                      G N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)			
1.	<b>Flows Bypass Bench</b> Remarks_____	G Location shown on site map	X N/A or okay
2.	<b>Bench Breached</b> Remarks_____	G Location shown on site map	X N/A or okay
3.	<b>Bench Overtopped</b> Remarks_____	G Location shown on site map	X N/A or okay
<b>C. Letdown Channels</b> X Applicable                      G N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1.	<b>Settlement</b> Areal extent_____ Remarks_____	G Location shown on site map Depth_____	X No evidence of settlement
2.	<b>Material Degradation</b> Material type_____ Remarks_____	G Location shown on site map Areal extent_____	X No evidence of degradation
3.	<b>Erosion</b> Areal extent_____ Remarks_____	G Location shown on site map Depth_____	X No evidence of erosion

4.	<b>Undercutting</b>	G Location shown on site map	X No evidence of undercutting
	Areal extent _____	Depth _____	
	Remarks _____		
5.	<b>Obstructions</b>	Type _____	X No obstructions
	G Location shown on site map	Areal extent _____	
	Size _____		
	Remarks _____		
6.	<b>Excessive Vegetative Growth</b>	Type _____	
	X No evidence of excessive growth		
	G Vegetation in channels does not obstruct flow		
	G Location shown on site map	Areal extent _____	
	Remarks _____		
<b>D. Cover Penetrations</b> X Applicable G N/A			
1.	<b>Gas Vents</b>	G Active	X Passive
	G Properly secured/locked	X Functioning	G Routinely sampled
	G Evidence of leakage at penetration		X Good condition
	G N/A		G Needs Maintenance
	Remarks:		
2.	<b>Gas Monitoring Probes</b>	G Functioning	G Routinely sampled
	X Properly secured/locked		X Good condition
	G Evidence of leakage at penetration	G Needs Maintenance	G N/A
	Remarks: All manholes locked. Plastic keep out signs deteriorated/gone for most manholes.		
3.	<b>Monitoring Wells</b> (within surface area of landfill)		
	G Properly secured/locked	G Functioning	G Routinely sampled
	G Evidence of leakage at penetration		G Good condition
		G Needs Maintenance	X N/A
	Remarks _____		
4.	<b>Leachate Extraction Wells</b>		
	G Properly secured/locked	X Functioning	G Routinely sampled
	G Evidence of leakage at penetration		G Good condition
		G Needs Maintenance	X N/A
	Remarks _____		
5.	<b>Settlement Monuments</b>	G Located	G Routinely surveyed
			G N/A
	Remarks: Not inspected		

<b>E. Gas Collection and Treatment</b>		G Applicable	G N/A
1.	<b>Gas Treatment Facilities</b> G Flaring                      X Thermal destruction              G Collection for reuse G Good condition              G Needs Maintenance  Remarks: No longer active. Not inspected.		
2.	<b>Gas Collection Wells, Manifolds and Piping</b> G Good condition              G Needs Maintenance  Remarks: No longer active. Not inspected.		
3.	<b>Gas Monitoring Facilities</b> ( <i>e.g.</i> , gas monitoring of adjacent homes or buildings) G Good condition              G Needs Maintenance              X N/A Remarks _____ _____		
<b>F. Cover Drainage Layer</b>		X Applicable	G N/A
1.	<b>Outlet Pipes Inspected</b> G Functioning                      G N/A  Remarks: Not inspected		
2.	<b>Outlet Rock Inspected</b> G Functioning                      G N/A  Remarks: Not inspected		
<b>G. Detention/Sedimentation Ponds</b>		G Applicable	X N/A
1.	<b>Siltation</b> Areal extent _____ Depth _____ G N/A G Siltation not evident Remarks _____ _____		
2.	<b>Erosion</b> Areal extent _____ Depth _____ G Erosion not evident Remarks _____ _____		
3.	<b>Outlet Works</b> G Functioning              G N/A Remarks _____ _____		
4.	<b>Dam</b> G Functioning              G N/A Remarks _____ _____		

<b>H. Retaining Walls</b>		G Applicable	X N/A
1.	<b>Deformations</b> Horizontal displacement_____ Vertical displacement_____ Rotational displacement_____ Remarks_____	G Location shown on site map	G Deformation not evident
2.	<b>Degradation</b> Remarks_____	G Location shown on site map	G Degradation not evident
<b>I. Perimeter Ditches/Off-Site Discharge</b>		X Applicable	G N/A
1.	<b>Siltation</b> Areal extent_____ Depth_____ Remarks_____	G Location shown on site map	X Siltation not evident
2.	<b>Vegetative Growth</b> G Vegetation does not impede flow Areal extent_____ Type_____ Remarks: There was some minor vegetative growth in the perimeter channel due to standing water. Regrading may need to be looked into.	G Location shown on site map	G N/A
3.	<b>Erosion</b> Areal extent_____ Depth_____ Remarks_____	G Location shown on site map	X Erosion not evident
4.	<b>Discharge Structure</b> Remarks_____	X Functioning	G N/A
<b>VIII. VERTICAL BARRIER WALLS</b>		G Applicable	X N/A
1.	<b>Settlement</b> Areal extent_____ Depth_____ Remarks_____	G Location shown on site map	G Settlement not evident
2.	<b>Performance Monitoring</b> Type of monitoring_____ G Performance not monitored Frequency_____ G Evidence of breaching Head differential_____ Remarks_____		



<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b>				G Applicable	X N/A
<b>A. Groundwater Extraction Wells, Pumps, and Pipelines</b>				G Applicable	G N/A
1.	<b>Pumps, Wellhead Plumbing, and Electrical</b>			G Good condition	G All required wells properly operating
				G Needs Maintenance	G N/A
	Remarks _____				
	_____				
	_____				
2.	<b>Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b>				
	G Good condition		G Needs Maintenance		
	Remarks _____				
	_____				
	_____				
3.	<b>Spare Parts and Equipment</b>				
	G Readily available	G Good condition	G Requires upgrade	G Needs to be provided	
	Remarks _____				
	_____				
	_____				
<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b>				G Applicable	X N/A
1.	<b>Collection Structures, Pumps, and Electrical</b>				
	G Good condition		G Needs Maintenance		
	Remarks _____				
	_____				
	_____				
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b>				
	G Good condition		G Needs Maintenance		
	Remarks _____				
	_____				
	_____				
3.	<b>Spare Parts and Equipment</b>				
	G Readily available	G Good condition	G Requires upgrade	G Needs to be provided	
	Remarks _____				
	_____				
	_____				

C. Treatment System		G Applicable	X N/A
1.	<b>Treatment Train</b> (Check components that apply) G Metals removal                      G Oil/water separation                      G Bioremediation G Air stripping                      G Carbon adsorbers G Filters _____ G Additive ( <i>e.g.</i> , chelation agent, flocculent) _____ G Others _____ G Good condition                      G Needs Maintenance G Sampling ports properly marked and functional G Sampling/maintenance log displayed and up to date G Equipment properly identified G Quantity of groundwater treated annually _____ G Quantity of surface water treated annually _____ Remarks _____ _____		
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) G N/A                      G Good condition                      G Needs Maintenance Remarks _____ _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> G N/A                      G Good condition                      G Proper secondary containment                      G Needs Maintenance Remarks _____ _____		
4.	<b>Discharge Structure and Appurtenances</b> G N/A                      G Good condition                      G Needs Maintenance Remarks _____ _____		
5.	<b>Treatment Building(s)</b> G N/A                      G Good condition (esp. roof and doorways)                      G Needs repair G Chemicals and equipment properly stored Remarks _____ _____		
6.	<b>Monitoring Wells</b> (pump and treatment remedy) G Properly secured/locked                      G Functioning                      G Routinely sampled                      G Good condition G All required wells located                      G Needs Maintenance                      G N/A Remarks _____ _____		
<b>D. Monitoring Data</b>			
1.	Monitoring Data G Is routinely submitted on time                      G Is of acceptable quality		
2.	Monitoring data suggests: G Groundwater plume is effectively contained                      G Contaminant concentrations are declining		

<b>D. Monitored Natural Attenuation</b>			
1.	<b>Monitoring Wells</b> (natural attenuation remedy) G Properly secured/locked      G Functioning      G Routinely sampled      G Good condition G All required wells located      G Needs Maintenance      G N/A Remarks _____ _____		
<b>X. OTHER REMEDIES</b>			
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.			
<b>XI. OVERALL OBSERVATIONS</b>			
<b>A.</b>	<b>Implementation of the Remedy</b>		
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).  This source control/containment remedy appears to be operating as designed.			
<b>B.</b>	<b>Adequacy of O&amp;M</b>		
Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.  The landfill cover and landfill gas systems appear to be well-maintained.			
<b>C.</b>	<b>Early Indicators of Potential Remedy Problems</b>		
Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.  None			
<b>D.</b>	<b>Opportunities for Optimization</b>		
Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.  Operations and monitoring optimization has historically occurred based on monitoring results. Continued review of these results may allow further optimization in the future.			



Northwest entrance of landfill, facing southeast



Northwest entrance of landfill, facing east





View from southwest portion of landfill, facing east



View from southwest portion of landfill, facing east





View of southern bottom-of-slope drainage channel where standing water has allowed plants to grow



View of southern bottom-of-slope drainage channel where standing water has allowed plants to grow





View of southeast corner bottom-of-slope drainage channel where standing water has allowed plants to grow. Note sheen on water.



View of southeast corner bottom-of-slope drainage channel where standing water has allowed plants to grow. Note sheen on water.





Panorama view from northeast corner facing southwest



Letdown channel on southwest portion of landfill, facing north





View of northeastern bottom-of-slope drainage channel where standing water has allowed plants to grow



Snake on landfill slope





Gas monitoring probe and passive vent on top of landfill



View from top of landfill facing west





View from top of landfill facing northwest



View from top of landfill facing north (inactive thermal oxidizer next to fence)



View from top of landfill facing northeast. Monitoring wells and drainage channel outlet shown at bottom of slope.



View from top of landfill facing east-northeast





View from top of landfill facing east



View from top of landfill facing south

**ATTACHMENT 4**  
**INTERVIEW RECORD FORMS**

### INTERVIEW DOCUMENTATION FORM

The following is a list of individuals interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews.

Doug Halley	Health Director	Acton Board of Health	8/6/09
Name	Title/Position	Organization	Date
Maryellen Johns	Project Manager	Remedium - a subsidiary of W.R. Grace	6/18/09 (at site); 6/22/09 (follow-up call)
Name	Title/Position	Organization	Date
Jennifer McWeeney	Project Manager	MassDEP	8/6/09
Name	Title/Position	Organization	Date
Mary Michelman	President	Acton Citizens for Environmental Safety	8/13/09
Name	Title/Position	Organization	Date
Matthew Mostoller	Environmental Compliance Manager	Acton Water District	8/6/09
Name	Title/Position	Organization	Date
Brent Reagor	Public Health Director	Concord Health Department	8/17/09
Name	Title/Position	Organization	Date

## INTERVIEW RECORD

<b>Site Name:</b> W. R. Grace Superfund Site (Acton, MA)		<b>EPA ID No.:</b> MAD001002252	
<b>Subject:</b> Five Year Review		<b>Time:</b> 2 pm	<b>Date:</b> 8/6/09
<b>Type:</b> <input checked="" type="checkbox"/> Telephone <input type="checkbox"/> Visit <input type="checkbox"/> Other <b>Location of Visit:</b>		<input type="checkbox"/> Incoming <input checked="" type="checkbox"/> Outgoing	
<b>Contact Made By:</b>			
<b>Name:</b> Barbara Weir	<b>Title:</b> Project Manager	<b>Organization:</b> Metcalf & Eddy, Inc	
<b>Individual Contacted:</b>			
<b>Name:</b> Doug Halley	<b>Title:</b> Health Director	<b>Organization:</b> Acton Board of Health	
<b>Telephone No:</b> 978-264-9634 <b>Fax No:</b> <b>E-Mail Address:</b> dhalley@town.acton.ma.us		<b>Street Address:</b> Acton Board of Health 472 Main Street, Acton, MA 01720	

**1. What is your overall impression of the project? (general sentiment)**

Doug feels the project is progressing within the community's expectations. There is some concern with the slow pace, but he is fairly happy with how things are going. He understands that having stakeholder involvement contributes to slowing the pace of work a bit but feels it is worth it. He feels each stakeholder brings a different perspective to the project and that the different perspectives all contribute to the project. There were concerns that stakeholder participation might become more limited during the RD phase of work but he feels that that has not taken place, and appreciates the level of participation that exists. He said EPA has been very open to stakeholder concerns.

**2. Have there been any health or safety issues associated with the site?**

It is too easy for people to gain access to the property because it is not possible to completely fence it (see response to next question), but other than that there are no known site-specific health and safety issues. Tick bites are an issue throughout the Town and the Town plans to start an education program. Similarly mosquitoes are an issue Town-wide.

**3. Are you aware of trespassers entering the property, and if yes, how often and in what type of activities do they engage?**

Trespassers have easy access to the site because it is not entirely fenced. Most commonly the trespassers are not likely aware they are trespassing and they are hikers. There are fewer incidents of motorbike riding than in the past.



**4. Have there been any unusual or unexpected activities or events at the site (e.g., fires)?**

No.

**5. Has the site been the subject of any community concerns or complaints (e.g., odor, noise, health, etc.)?**

Complaints are at a real low – no complaints from neighbors or others have been received in quite awhile.

**6. Do you feel well informed about site activities and progress of the cleanup, and do you have any comments, suggestions, or recommendations regarding the project?**

Doug feels he is well informed and he likes the monthly stakeholder calls. He thinks recent reports have been very good and is pleased with the level of information available. He is glad that the Town of Concord is also being included in stakeholder calls. He has no suggestions.

**7. Is the Town planning to maintain the moratorium on private irrigation wells in the plume area until the cleanup is complete?**

There is no official moratorium; the Board of Health has an administrative hold on issuing well permits within the plume area. The Board of Health is not in a position to pass a moratorium because it is not clear how long it would need to be in place, and there is also the complication that the area where wells are not allowed will change over time as the plume shrinks. Updating the area is not realistic to do every year. The Town will not issue new permits within the area currently defined without direction from EPA. Grace will be preparing an Institutional Controls Plan and at that time, with input from EPA, DEP, and the stakeholders including Board of Health, it can be determined how to proceed with well restrictions (moratorium or some other mechanism to prevent exposure until cleanup is complete).

**8. Are there any areas of known or suspected contamination at the site that you feel are not being adequately addressed by the remedial actions and/or remedial designs?**

No.

## INTERVIEW RECORD

<b>Site Name:</b> W. R. Grace Superfund Site (Acton, MA)		<b>EPA ID No.:</b> MAD001002252	
<b>Subject:</b> Five Year Review		<b>Time:</b> 10:00 am 2:00 pm	<b>Date:</b> 6/18/2009 6/22/2009 (phone)
<b>Type:</b> <input checked="" type="checkbox"/> Telephone <input checked="" type="checkbox"/> Visit <input type="checkbox"/> Other <b>Location of Visit:</b> WR Grace Property, Acton, MA (follow-up via phone on 6/22/09)		<input type="checkbox"/> Incoming <input type="checkbox"/> Outgoing	
<b>Contact Made By:</b>			
<b>Name:</b> Barbara Weir Sean Czarniecki	<b>Title:</b> Project Manager Project Engineer	<b>Organization:</b> AECOM/Metcalf & Eddy, Inc AECOM/Metcalf & Eddy, Inc	
<b>Individual Contacted:</b>			
<b>Name:</b> Maryellen Johns	<b>Title:</b> Project Manager	<b>Organization:</b> Remedium Group, Inc	
<b>Telephone No:</b> 617-498-2668 <b>Fax No:</b> 617-498-2677 <b>E-Mail Address:</b> maryellen.johns@grace.com		<b>Street Address:</b> 62 Whittemore Ave Cambridge, MA 02140	

**1.A. What is your overall impression of the project? (general sentiment)**

OU-1 is in place and being maintained. It is going well and there aren't many maintenance issues. OU-3 is in a transition phase and going as expected.

**2.A. Is the remedy functioning as expected? How well is the remedy performing?**

The remedy at OU-1 is performing well.

**3.A. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?**

Following cap installation at the landfill, contaminant concentrations in groundwater were shown to be decreasing. Since changing over to passive landfill gas venting, the air monitoring program indicated 85% of reported lab results are non-detect.

**4.A. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.**

The O&M presence (by O&M, Inc.) is not continuous. Weekly – Check site to make sure things are okay. Monthly – Water levels and flow from recovery wells; check small shed associated with air stripper. Quarterly – Sample air stripper influent/effluent and

effluent to Sinking Pond. Quarterly – Check landfill cap and swales; clean air stripper packing with 35% hydrogen peroxide solution. Semi-annual – Change out carbon in groundwater treatment system.

**5.A. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routes since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.**

No significant changes.

**6.A. Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.**

No unexpected O&M difficulties or costs – only anticipated system modifications.

**7.A. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.**

There were some cost savings associated with changing some monitoring wells over to passive diffusive bag (PDB) samplers. Comparison sampling (PDB vs low-flow) was performed prior to the change to provide relationship between results of both methods.

**8.A. Do you have any comments, suggestions, or recommendations regarding the project?**

None provided.

## **SUPPLEMENTAL QUESTIONS**

**1.B. How have the treatment processes changed or been adjusted over the last five years?**

No changes. OU-3 is currently in the pre-design phase.

**2.B. Have there been any health and safety issues on-site?**

Ticks – Workers have been treated for lyme disease.

**3.B. Has site ownership changed?**

No.

**4.B. What is the zoning of the property? Are there any institutional controls/deed restrictions in place? Are additional IC's anticipated? When? Where (location)?**

Zoned for Technology District. There is an IC in place for no disruption of the landfill

within the fenceline. Plans for a groundwater IC have been delayed until the OU-3 groundwater design is complete. Currently, the town has an administrative hold on private well installation within the plume area.

**5.B. How frequently are authorized individuals present at the property (days/week)?**

See question 4A for summary of O&M, Inc. schedule.  
Sampling contractor (currently Geotrans) can be on site daily for 6-8 weeks during sampling events.  
Maryellen Johns visits the site approximately twice a month.

**6.B. What are the planned future uses of the property (if different from current uses)?**

Nothing planned at this time.

**7.B. What measures have been taken to secure the site and the contaminated areas (e.g., fencing, locks, signage etc.)? How successful have these measures been?**

Fencing, locks, and signage have all been used. People still get into the site to walk dogs and kids come onto the site via walking down the railroad tracks. "No Trespassing" signs sometimes get ripped down and are periodically replaced.

**8.B. Is there evidence or sightings of trespassers on the property? If yes, how often and what type of activities do they engage in? What actions are taken if trespassing occurs? What actions are taken to prevent trespassing?**

There is evidence of dog walkers, ATV and motorbike use, and bonfires. Police have keys to the site – they will drive to the end of Independence Road, but Maryellen is not sure if they go in and drive around at all. If the trespassing is escalating, special details have been hired, but this is not routine.

**9.B. Have there been any events of vandalism at the property?**

There has been graffiti. Historically, there has been damage to an on-site office trailer and the small building by the air stripper.

**10.B. Have there been any unusual or unexpected activities or events at the site (e.g., flooding)?**

No.

**11.B. Has the site been the subject of any community complaints (e.g., odor, noise, health, etc.)?**

There have not been any odor complaints in a long time. Historically (prior to the ROD), there were nuisance odors associated with the chemistry occurring in the air

stripper.

There was a noise complaint when the fan on the building next to the air stripper was off balance. This was a known maintenance issue and fixed after the complaint.

## INTERVIEW RECORD

<b>Site Name:</b> W. R. Grace Superfund Site (Acton, MA)		<b>EPA ID No.:</b> MAD001002252	
<b>Subject:</b> Five Year Review		<b>Time:</b> 3 pm	<b>Date:</b> 8/6/09
<b>Type:</b> <input checked="" type="checkbox"/> Telephone <input type="checkbox"/> Visit <input type="checkbox"/> Other <b>Location of Visit:</b>		<input type="checkbox"/> Incoming <input checked="" type="checkbox"/> Outgoing	
<b>Contact Made By:</b>			
<b>Name:</b> Barbara Weir	<b>Title:</b> Project Manager	<b>Organization:</b> Metcalf & Eddy, Inc	
<b>Individual Contacted:</b>			
<b>Name:</b> Jennifer McWeeney	<b>Title:</b> Project Manager	<b>Organization:</b> MassDEP	
<b>Telephone No:</b> 617-654-6560 <b>Fax No:</b> <b>E-Mail Address:</b> jennifermcweeney@state.ma.us		<b>Street Address:</b> MassDEP One Winter Street, Boston, MA 02108	

**1. What is your overall impression of the project? (general sentiment)**

Jennifer commented that the site is well-regulated and progress is being consistently made. The EPA Project Manager is good about keeping the schedule moving along. There are some delays but there is an overall consciousness of schedule.

**2. Do you have any comments, suggestions, or recommendations regarding the project?**

Jennifer would prefer that the Annual Groundwater Monitoring Reports be submitted in a more timely manner, say within 3 months of completing the sampling event rather than the 6 to 9 months it sometimes takes.

Jennifer likes that conference calls among EPA, DEP, and Grace and their consultants are used to resolve questions regarding comments from the agencies and stakeholders on PRP reports. However, she is concerned that sometimes Grace and their consultants expect an immediate decision by EPA and DEP during such calls, when further discussion between EPA and DEP is sometimes needed before a decision is reached.

**3. Has the site been the subject of any community complaints directed to your agency (e.g., odor, noise, health, etc.)?**

There have been no complaints to DEP about the site.

**4. Do you have any recommendations for reducing or increasing activities at the site?**

No.

**5. Is there any other information that you wish to share that might be of use?**

No. Jennifer noted that overall, she is happy with progress at the site, and she appreciates the accessibility of the EPA Project Manager.

## INTERVIEW RECORD

<b>Site Name:</b> W. R. Grace Superfund Site (Acton, MA)		<b>EPA ID No.:</b> MAD001002252	
<b>Subject:</b> Five Year Review		<b>Time:</b> 2 pm	<b>Date:</b> 8/13/09
<b>Type:</b> <input checked="" type="checkbox"/> Telephone <input type="checkbox"/> Visit <input type="checkbox"/> Other <b>Location of Visit:</b>		<input type="checkbox"/> Incoming <input checked="" type="checkbox"/> Outgoing	
<b>Contact Made By:</b>			
<b>Name:</b> Barbara Weir	<b>Title:</b> Project Manager	<b>Organization:</b> Metcalf & Eddy, Inc	
<b>Individual Contacted:</b>			
<b>Name:</b> Mary Michelman	<b>Title:</b> President	<b>Organization:</b> Acton Citizens for Environmental Safety	
<b>Telephone No:</b> 978-263-7370 <b>Fax No:</b> <b>E-Mail Address:</b> msmichelman@comcast.net		<b>Street Address:</b> 6 Magnolia Drive, Acton, MA 01720	

**1. What is your overall impression of the project? (general sentiment)**

Mary is happy that the site is in the design process now, and that the Northeast Area in particular is underway with the installation of the first extraction well. She is pleased that Grace is planning to dispose of excavated sediments off-site. She appreciates that stakeholder comments on design deliverables are seriously considered by EPA, with stakeholder concerns often included in EPA's final comments on design documents. She hopes that everyone continues to pay attention to the details of the design. Examples where this attention to detail have paid off, in her view, are the revisions to the excavation areas for Sinking Pond and the North Lagoon Wetland, and having the Northeast Area extraction well go deeper when contamination was found at the deepest interval. Overall, her impression is positive with the progress being made.

**2. Are you aware of any community concerns or complaints related to the site (e.g., odor, noise, health, etc.)?**

Mary and other ACES members get calls from people regarding the site.

Mary has heard from one abutter in the Northeast Area who received a recent fact sheet on activities there, and was concerned about possible odors from the treatment system, and other potential disturbances to neighbors. She noted that the abutter had also called the EPA project manager and other site contacts about the same issues.

Mary received calls related to the ATSDR study and 2008 public meeting. People voiced concerns about odors and also about immunological problems/diseases they or their neighbors have had that they are concerned may be related to past exposures to contamination from the Grace site. Some people did comment at the ATSDR public meeting and asked questions about the statistically significant past incidences of brain



and CNS cancers discussed in the report, as well as other health concerns. Several people took the opportunity to speak with representatives from MassDPH about health concerns, including those related to pregnancy and infants. However some people have mentioned to ACES their reluctance, and that of neighbors, to raise questions about whether their health problems may be site-related, because of concerns about reducing the property value of homes near the site.

There is an area of land owned by Grace near Lexington Drive and north of the MBTA tracks that, as part of a sewer betterment settlement, Grace and the Town have agreed will have a conservation restriction. This area is not a location where there was any disposal, but some people have asked that the area be tested to provide reassurance that the soil is not contaminated.

Mary has heard from several people that they are concerned that adults, children and their pets walk on the site and could be exposed to contamination in sediment. It is not obvious when people are crossing over onto Grace property. People may walk near the North Lagoon Wetland, and there is concern that there could be some exposure to the arsenic-contaminated sediments. ACES thinks that, at a minimum, signs are needed in this area warning people of the contamination, as trespassing has been a chronic issue at the site. ACES has reminded the public to not trespass on the W.R. Grace property.

Mary sometimes gets questions about the site from people considering buying homes in the vicinity of the site. She refers them to sources of information such as the Acton Water District, and the ACES, Town of Acton and EPA web sites.

Mary anticipates that she may hear more concerns/complaints once construction for the remedial actions gets going, as the site will become more high profile.

### **3. Do you feel well informed about site activities and progress of the cleanup?**

Mary feels that she and ACES are well-informed due to ACES active involvement in the site. Members of the general public may be more or less informed depending on their interest in the site and its relevance to their lives. ACES and the Town try to make it easier for people to access information by posting it on their web sites. W.R. Grace issues are also brought up during televised Board of Selectmen meetings. The Beacon newspaper writes periodic articles about the site. The repository at the library is not as user-friendly, now that it has been relocated to the 3<sup>rd</sup> floor because of space limitations, but the librarian is helpful in pointing it out to people who ask. Many people may not look for information beyond that which is available in the Beacon, but further information is available for those who seek it.

With respect to stakeholders such as ACES, Mary feels that access to site information is more controlled than it was prior to the 2005 ROD. EPA is very responsive in providing information when asked, but documents (such as Grace's responses to comments) may not be provided to the Acton stakeholders automatically as was true pre-ROD. She understands that the site is now in a different phase (design phase) and that EPA is doing more than is required to keep the stakeholders informed and involved. She appreciates the stakeholder calls and finds them very helpful. but sometimes wishes she could get answers to questions in between calls. (Conference calls are generally held every other month.) She also thinks that the face-to-face meetings that were held on a regular basis pre-ROD with Grace, their consultants, EPA, DEP, and the stakeholders were useful in keeping everyone fully informed. Now the stakeholders and Grace do not have direct interaction and the stakeholders are not

present for any of the discussions between EPA, DEP and WR Grace.

**4. Are there any areas of known or suspected contamination at the site that you feel are not being adequately addressed by the remedial actions and/or remedial designs?**

Although it is recognized that this part of the Grace property was not a disposal area, there is a lingering concern about the Grace-owned conservation-restricted land that has been expressed to Mary. People would like some sampling to be reassured that there is no contamination.

ACES is concerned about site soil in general. The five year reviews discuss that soil was remediated to cleanup standards and confirmatory sampling was done at the time that cleanup was completed. ACES still would like to see some additional soil sampling, and suggests that it should occur before the closure of the OU-3 cleanup and/or when there are plans for site reuse, (whichever comes first), to ensure the land is safe for the intended reuse. Maybe this could be done when there is a property transfer.

ACES commented before the recent Northeast Area extraction/reinjection well drilling about concerns regarding the planned disposal of drill cuttings via spreading them on the ground. ACES had requested that the drill cutting disposal locations be documented (It was ACES understanding that this is common practice at other sites.) Field screening of soil samples during drilling showed high PID readings of up to 50ppm. Subsequent laboratory analyses found "nothing problematic" in soil and groundwater samples. ACES reiterates its request that drill cutting disposal locations be documented.

ACES had recommended active cleanup in the Assabet River Area and the Lagoon Area. They understand that the 2005 ROD selected Monitored Natural Attenuation for these areas but continue to think that active cleanup would have been better. ACES wants continued monitoring of these areas and appreciates that EPA is requiring Grace to restore annual monitoring in some Lagoon Area wells and to keep some wells in the monitoring program that WR Grace had proposed to remove.

**5. Do you have any comments, suggestions, or recommendations regarding the project?**

- a) Signage (and/or Fencing?) – ACES recommends this for the North Lagoon Wetland area in particular and possibly also Sinking Pond, because of concern that trespassers may be exposed to contamination. At a minimum, ACES would like there to be signs placed in the North Lagoon Wetland area asap.
- b) ACES wants to make sure that there is active disclosure of contamination to future users of the site.
- c) ACES recommends that site soil, especially in former disposal areas, be retested to make sure it is acceptable for any planned reuse of the site.
- d) ACES believes that certain future uses of the site should not be allowed, such as Underground Storage Tanks, disposal of sewage effluent, or a golf course where herbicides would be applied, because of concerns about degrading the aquifers that supply five nearby public drinking water wells. Any reuse should not introduce

new contaminants into the area or provide exposure to any existing contaminants.

- e) Reuses that ACES supports include: office park, and wildlife habitat/open space. ACES advocates low-impact development practices for whatever development does take place on the property.

## INTERVIEW RECORD

<b>Site Name:</b> W. R. Grace Superfund Site (Acton, MA)		<b>EPA ID No.:</b> MAD001002252	
<b>Subject:</b> Five Year Review		<b>Time:</b> 09:30	<b>Date:</b> 8/6/09
<b>Type:</b> <input checked="" type="checkbox"/> Telephone <input type="checkbox"/> Visit <input type="checkbox"/> Other <b>Location of Visit:</b>		<input type="checkbox"/> Incoming <input checked="" type="checkbox"/> Outgoing	
<b>Contact Made By:</b>			
<b>Name:</b> Barbara Weir	<b>Title:</b> Project Manager	<b>Organization:</b> Metcalf & Eddy, Inc	
<b>Individual Contacted:</b>			
<b>Name:</b> Matthew Mostoller	<b>Title:</b> Environmental Compliance Manager	<b>Organization:</b> Acton Water District	
<b>Telephone No:</b> 978-263-9107 <b>Fax No:</b> 978-264-0148 <b>E-Mail Address:</b> Matt@actonwater.com		<b>Street Address:</b> Acton Water District 693 Massachusetts Avenue, Acton, MA 01720	

**1. What is your overall impression of the project? (general sentiment)**

Matt has been following the project for the past few years but is new to actively being part of the project. He thinks it is fairly well-managed, that progress is being made, and that EPA, DEP, the stakeholders, and Grace are doing a fairly good job of working together and accommodating each others' concerns.

**2. Do you anticipate any problems arising from the operation of the Northeast Area groundwater extraction and treatment system?**

The Water District has some concern regarding potential effects of reinjecting treated groundwater to the unconsolidated deposits, such as possibly mobilizing petroleum contamination from the BOC Gases (Linde) site. The Water District is hopeful the treatment system will be effective on the VDC plume and not create any detrimental effects and supports monitoring over time to make sure of this.

**3. Do you feel well informed about site activities and progress of the cleanup?**

Matt feels well-informed. The Water District appreciates getting groundwater data up front (as is done now) instead of waiting until Grace's consultant completes their formal report on the annual monitoring program.

**4. Are there any areas of known or suspected contamination at the site that you feel are not being adequately addressed by the remedial actions and/or the remedial designs?**

Matt just completed his review of the 2008 Monitoring Program Report. The report recommends eliminating some wells. Matt has concerns about possibly eliminating wells from the program prematurely. This could result in not adequately addressing the edges of the plume over time. Comments from the Water District and other stakeholders reflect this concern. EPA recently sent comments on this report to Grace and Matt is hoping to see a favorable response to the concern of removing wells too soon.

**5. Does the monitoring done by the District show any trends of contaminant levels increasing or decreasing at the School Street or Assabet wellfields?**

For the most part, the monitoring shows consistent, low –level detections of VDC with no real trend. 1,4-Dioxane was first detected a few years back at the School Street and Assabet well fields and the Water District is concerned with this. Samples for 2009 were just collected last week and Matt does not have the results yet. For two locations the 1,4-dioxane trend appears to be upward, while it appears to be downward at two other locations. The Scribner well shows the most 1,4-dioxane. MTBE is still present in the Assabet wells.

**6. Do you have any comments, suggestions, or recommendations regarding the project?**

Matt recommends that monitoring continue at the edges of the plume and that wells not be dropped from the monitoring program too quickly. He is concerned that there will be potential changes in the aquifer coming up, due to the remedial actions coming on line, changes the Water District is making or plans to make in the future (e.g, when WRG-3 comes on line), and other changes such as wastewater discharges. These changes could shift the plume. Matt urges caution in dropping wells and over-reliance on the groundwater flow model. He recognizes the significant efforts undertaken to study the aquifer and urges that this understanding of the aquifer not remain static.

**7. What is the current status of the project to activate WRG-3 as a water supply well for the District?**

Plans to activate WRG-3 are currently on hold for at least 5 years. The well is permitted and DEP has approved the Zone 2, but the Water District for the immediate future has changed focus to the School Street well field. The current plan is to possibly re-locate the Christofferson well and increase the treatment capability at the School Street well field first, before returning attention to WRG-3 (Assabet well field). WRG-3 may be classified as “groundwater under the direct influence of surface water” which might require that filtration treatment be included there. In relocating the Christofferson well, filtration treatment per surface water requirements would likely not be needed.

**8. Does the District anticipate that the wellhead treatment system at the Assabet well field will be used for WRG-3 when it is brought on line?**

Yes, when WRG-3 is brought on line, the existing treatment system would be used and might be upgraded to include some type of advanced oxidation system. As noted above, filtration treatment might also need to be included.

**9. Is there any other information that you wish to share that might be of use?**

No. Matt reiterated that he hopes that the project keeps moving forward and relationships remain positive.

## INTERVIEW RECORD

<b>Site Name:</b> W. R. Grace Superfund Site (Acton, MA)		<b>EPA ID No.:</b> MAD001002252	
<b>Subject:</b> Five Year Review		<b>Time:</b> 11 am	<b>Date:</b> 8/17/09
<b>Type:</b> <input checked="" type="checkbox"/> Telephone <input type="checkbox"/> Visit <input type="checkbox"/> Other <b>Location of Visit:</b>		<input type="checkbox"/> Incoming <input checked="" type="checkbox"/> Outgoing	
<b>Contact Made By:</b>			
<b>Name:</b> Barbara Weir	<b>Title:</b> Project Manager	<b>Organization:</b> Metcalf & Eddy, Inc	
<b>Individual Contacted:</b>			
<b>Name:</b> Brent Reagor	<b>Title:</b> Public Health Director	<b>Organization:</b> Concord Health Department	
<b>Telephone No:</b> 978-318-3275 <b>Fax No:</b> <b>E-Mail Address:</b> breagor@concordma.gov		<b>Street Address:</b> 141 Keyes Road, Second Floor Concord, MA 01742	

**1. What is your overall impression of the project? (general sentiment)**

Brent used to work in Acton prior to taking his current position as Concord Public Health Director, so has been familiar with the project for awhile. He thinks it is amazing how much stakeholder involvement there is, and that EPA and DEP should be commended for their outreach. There is much more outreach than for other sites he is familiar with. He feels that the outreach and stakeholder involvement is great, as long as it does not impede progress towards the remediation of the site.

**2. Has the site been the subject of any community concerns or complaints (e.g., odor, noise, health, etc.)?**

Brent has not received any complaints from Concord residents. He occasionally gets questions about the site but they are not frequent. There is a lot of information available about the site that he refers questioners to. More frequently, he gets questions from Town staff regarding progress at the MCP site along the Assabet River.

**3. Do you feel well informed about site activities and progress of the cleanup?**

Brent feels very well informed – see response to related question #1 – the Government Parties are very involved and have made a great effort to keep the stakeholders involved as well.

**4. Do you have any comments, suggestions, or recommendations regarding the project?**

Brent suggests that the Government Parties give some consideration to the need for monthly stakeholder calls, and thinks that less frequent calls may be sufficient. While Brent appreciates the calls, he thinks they should be re-evaluated on occasion to make sure they are the best use of people's time (EPA, DEP, contractors) and do not cause delays in site progress. He thinks it is important to do what can be done to make them effective and efficient.

**5. Are there any areas of known or suspected contamination at the site that you feel are not being adequately addressed by the remedial actions and/or remedial designs?**

Brent does not feel there are any areas not being addressed. He thinks that the focus should continue to be the remediation of the Northeast Area Plume. He is wondering about the final disposition of Sinking Pond, once groundwater treatment with discharge to the pond ends years from now (once the Landfill Area plume remediation is completed). He is wondering if any additional restoration work will be needed (beyond the sediment remediation already planned) to return the pond to its natural state, prior to any treatment plant discharges being directed into it.



**ATTACHMENT 5**

**ARARS REVIEW**

**TABLE A5-1. CHEMICAL-SPECIFIC ARARS AND CRITERIA, ADVISORIES, AND GUIDANCE  
W.R. GRACE SUPERFUND SITE – OPERABLE UNIT 1 - ACTON AND CONCORD, MASSACHUSETTS**

<b>ARARs</b>	<b>REQUIREMENTS</b>	<b>REQUIREMENT SYNOPSIS</b>	<b>FIVE YEAR REVIEW</b>
Federal Regulatory Requirements	SDWA - Maximum Contaminant Levels (MCLs) (40 CFR 141.11 - 141.16)	MCLs have been promulgated for a number of organic and inorganic contaminants. These levels regulate the concentration of contaminants in public drinking water supplies, but may also be considered relevant and appropriate for groundwater aquifers used for drinking water. MCLs for indicator compounds were used as target cleanup levels for groundwater under each waste area. Attaining soil cleanup goals was expected to ensure that any future migration of residual contaminants in the soil will not cause exceedances of MCLs in groundwater under each waste area.	Soil cleanup goals were met during the OU-1 source control remedy. Soil cleanup goals were selected so that these standards can be met in the future.
State Regulatory Requirements	Massachusetts Drinking Water Regulations (310 CMR 22.00)	Establishes MCLs for drinking water supplies, as the federal MCLs. State drinking water standards are the same as the federal MCLs that were used.	See above.
	Massachusetts Groundwater Quality Standards (314 CMR 6.00)	Establishes minimum groundwater quality criteria. Similar to MCLs, groundwater quality criteria were expected to be attained by reducing residual soil contaminants to the Soil Cleanup Goals.	Soil cleanup goals were met during the OU-1 source control remedy. Soil cleanup goals were selected so that these standards can be met in the future. Groundwater quality criteria attainment will be evaluated as part of OU-3.

**TABLE A5-2. ACTION-SPECIFIC ARARS**  
**W.R. GRACE SUPERFUND SITE – OPERABLE UNIT 1 - ACTON AND CONCORD, MASSACHUSETTS**

<b>ARARs</b>	<b>REQUIREMENTS</b>	<b>ORIGINAL STATUS</b>	<b>REQUIREMENT SYNOPSIS</b>	<b>FIVE YEAR REVIEW</b>
Federal Regulatory Requirements	Clean Air Act - National Air Quality Standards for Total Suspended Particulates (40 CFR 50.6)	Applicable	This regulation specifies maximum primary and secondary 24-hour concentrations for particulate matter.	These requirements are not ARARs per se, but are implemented through the State implementation requirements.
	OSHA - Worker Safety Regulations (29 CFR 1926)	Applicable	This regulation specifies the type of safety equipment, training and procedures to be followed during construction of the remedy. These regulations were applicable during construction of the selected remedy.	The OSHA rules are not ARARs per se, but they are worker safety rules that must always be complied with during operations, maintenance, and monitoring activities at the site.
	Protection of Archaeological Resources (32 CFR 229.4)	Applicable	This provides procedures for the protection of archaeological resources. If any of these resources are found during soil excavation, work would stop until the area has been reviewed by federal and state archaeologists. Research performed prior to remedy construction suggested that none would be found at this site.	No archaeological resources were found during remedy implementation.
	DOT Rules for the Transportation of Hazardous Materials (49 CFR 107, 171.1 - 171.500)	Applicable	This regulation outlines procedures for the packaging, labeling, manifesting, and transport of hazardous materials. Any shipments to and from the site during the remedy are to comply with these rules.	DOT rules are not ARARs because they regulate off-site activities. DOT rules were complied with for off-site shipments.

**TABLE A5-2. ACTION-SPECIFIC ARARS**  
**W.R. GRACE SUPERFUND SITE – OPERABLE UNIT 1 - ACTON AND CONCORD, MASSACHUSETTS**

<b>ARARs</b>	<b>REQUIREMENTS</b>	<b>ORIGINAL STATUS</b>	<b>REQUIREMENT SYNOPSIS</b>	<b>FIVE YEAR REVIEW</b>
State Regulatory Requirements	Massachusetts Standards for Owners and Operators of Permitted Hazardous Waste Facilities (310 CMR 30.510-516)	Relevant and Appropriate	This regulation provides general facility requirements for waste analysis, security measures, inspections, and training requirements.	The Industrial Landfill was constructed and is operated in accordance with these requirements. These requirements remain relevant and appropriate and are being complied with.
	Contingency Plan, Emergency Procedures, Preparedness and Prevention (310 CMR 30.520-524)	Relevant and Appropriate	This regulation outlines the requirements for emergency procedures to be used following explosions and fires, as well as safety equipment and spill-control requirements. This regulation also requires that threats to public health and the environment be minimized.	These requirements remain relevant and appropriate and are being complied with.
	Massachusetts Manifesting, Recordkeeping, and Reporting (310 CMR 30.530-545)	Relevant and Appropriate	Requires manifesting hazardous waste shipped off-site for disposal. Any off-site shipments of waste materials were to be manifested.	These requirements are not ARARs, as they are considered off-site requirements.

**TABLE A5-2. ACTION-SPECIFIC ARARS**  
**W.R. GRACE SUPERFUND SITE – OPERABLE UNIT 1 - ACTON AND CONCORD, MASSACHUSETTS**

ARARs	REQUIREMENTS	ORIGINAL STATUS	REQUIREMENT SYNOPSIS	FIVE YEAR REVIEW
State Regulatory Requirements (continued)	Massachusetts Closure and Post-closure (310 CMR 30.580-595)	Relevant and Appropriate	This requirement details the specific requirements for closure and post-closure of hazardous waste facilities.	The landfill cap was constructed in accordance with these requirements. These requirements remain relevant and appropriate. Post-closure operations, maintenance and monitoring are currently being performed in accordance with the Post Closure Operations and Maintenance Plan. The landfill closure was designed to meet RCRA requirements for landfill closure.
	Massachusetts - Landfills (310 CMR 30.620-633)	Relevant and Appropriate	Establishes requirements for construction, operation, monitoring, and maintenance of hazardous waste landfills.	The landfill cap was constructed in accordance with these requirements. Operations and maintenance have also been performed in accordance with these requirements. These requirements remain relevant and appropriate. The landfill closure was designed to meet the requirements for landfill closure. Post-closure operations, maintenance and monitoring are currently being performed in accordance with the Post Closure Operations and Maintenance Plan.

**TABLE A5-2. ACTION-SPECIFIC ARARS**  
**W.R. GRACE SUPERFUND SITE – OPERABLE UNIT 1 - ACTON AND CONCORD, MASSACHUSETTS**

ARARs	REQUIREMENTS	ORIGINAL STATUS	REQUIREMENT SYNOPSIS	FIVE YEAR REVIEW
State Regulatory Requirements (continued)	Massachusetts Groundwater Protection (310 CMR 30.660-675)	Relevant and Appropriate	Provides performance requirements for a groundwater monitoring network, and standards for a monitoring program and sample analysis.	Groundwater at each disposal area is monitored to determine the effectiveness of the remedial measures; a groundwater monitoring program is already implemented as part of the ARS. Monitoring activities continue at the site. These regulations are still relevant and appropriate.
	Massachusetts Ambient Air Quality Standards (310 CMR 6.00) and Air Quality Control Regulations (310 CMR 7.00)	Applicable	Establishes primary and secondary standards for emissions of dust and odor from construction and remedial activities.	These requirements remain applicable. Landfill gas control and groundwater treatment using air stripping are still performed. Particulate emissions during excavation and solidification activities were controlled to meet the requirements. Odor emissions from the groundwater treatment air stripper are controlled with Best Available Control Technology (BACT). A gas control system utilizing BACT was installed during landfill cap construction to control emissions.

**TABLE A5-2. ACTION-SPECIFIC ARARS**  
**W.R. GRACE SUPERFUND SITE – OPERABLE UNIT 1 - ACTON AND CONCORD, MASSACHUSETTS**

ARARs	REQUIREMENTS	ORIGINAL STATUS	REQUIREMENT SYNOPSIS	FIVE YEAR REVIEW
State Regulatory Requirements (continued)	Massachusetts Sanitary Landfill Regulations (310 CMR 19.00)	Applicable	<p>This regulation outlines the requirements for closure of solid waste landfills.</p> <p>The Battery Separator Area chip piles were to be closed as a solid waste landfill with, among other things, an intermediate cover consisting of impervious material or flexible membrane which prevents the percolation of surface or rain water.</p>	<p>These requirements are no longer applicable. These requirements would have applied to capping of the Battery Separator Area chip piles, which was part of the OU-1 ROD-specified remedy. However, the chips were actually excavated and placed in the Industrial Landfill.</p>

**ATTACHMENT 6**

**EFFLUENT DISCHARGE LIMITS TO SINKING POND**





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NEW ENGLAND – REGION 1  
ONE CONGRESS STREET SUITE 1100  
BOSTON MASSACHUSETTS 02114-2023

December 20, 2006

Ms. Maryellen Johns  
Project Engineer  
W. R. Grace & Co.  
62 Whittemore Avenue  
Cambridge, MA 02140

Re: Approval of Effluent Discharge Limits to Sinking Pond – W. R. Grace (Acton Plant) Superfund Site,  
Acton and Concord, MA.

Dear Ms. Johns:

Over the last several months, as required by the Remedial Design/Remedial Action statement of work, W. R. Grace and EPA's Office of Ecosystem Protection have been coordinating with each other in order to finalize appropriate effluent discharge standards for the site.

Both Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (MassDEP) have received your letter and Attachment 1, dated December 14, 2006, concerning the effluent discharge limits for the new groundwater treatment system.

EPA, after reasonable opportunity for review and comment by MassDEP, hereby approves the effluent discharge limits as listed in Attachment 1, dated 12/14/06. Please note that after the new treatment system is operational for a period of two years, W. R. Grace shall provide EPA and MassDEP with an arsenic optimization report. EPA, after reasonable opportunity for review and comment by MassDEP, will review this optimization report and make the final determination for an appropriate final arsenic discharge limit which can be consistently achieved.

Within the next few weeks, I will be working with EPA's Office of Ecosystem Protection to provide you with a supplement effluent memo which shall provide the rational for setting the limits and requirements listed in Attachment 1. This new effluent memo will be used to supplement the 10/03/06 effluent memo.

If you have any questions or need further clarification please contact me at 617-918-1448

Thank you,

Sincerely,

Derrick Golden  
Remedial Project Manager  
Office of Remediation and Restoration  
Environmental Protection Agency

cc: Bob Cianciarulo – EPA  
Gretchen Muench - EPA  
Dan Keefe - MassDEP  
File - EPA  
Acton Memorial Library  
Doug Halley – Acton Board of Health  
Jim Deming – Acton Water District  
Mary Michlemen - ACES

# REMED IUM

Maryellen Johns  
Remedium Group Inc.  
A subsidiary of W.R. Grace & Co.  
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Cambridge, MA 02140  
Tel: (617) 498-2668  
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December 14, 2006

Mr. Derrick Golden  
Remedial Project Manager  
USEPA Region I  
One Congress Street, Mail Code HBO  
Boston, Massachusetts 02203-0001

Mr. Dan Keefe  
Bureau of Waste Site Cleanup  
MA DEP  
One Winter Street, 5th Floor  
Boston, Massachusetts 02108

SUBJECT: Final limits for effluent discharge to Sinking Pond from Treatment System

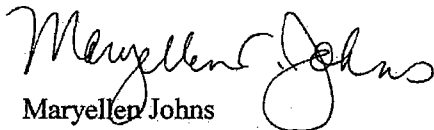
Dear Derrick and Dan,

Pursuant to the Initial Remedial Steps Phase of the Operable Unit Three Remedial Design/Remedial Action Statement of Work (the SOW) Section VI. A. 4., W.R. Grace is submitting final effluent discharge limits for Sinking Pond to EPA for approval. Attachment 1 documents the final limits for treated effluent discharge to Sinking Pond based on coordination with EPA's Office of Ecosystem Protection.

As shown in footnote 1 of Attachment 1, within two years of the startup of the Landfill Area chemical precipitation metals removal groundwater treatment system required by the ROD (the "Treatment System"), Grace will submit a report documenting the startup and optimization of the Treatment System. This report will also document the arsenic concentration in the treated effluent that can be met on a consistent basis with the Treatment System. The optimization of the Treatment System will focus on the metals removal portion of the system and, at this time, it is anticipated this work will include adjusting the amounts of oxidizing agents and flocculants used. Further details of the optimization process will be incorporated into the Landfill Area Groundwater Operation and Maintenance Plan required under section VII.A.c.1.

The SOW requires submission of the Landfill Area Groundwater Pre-Design Workplan 45 days after the Landfill Area Groundwater discharge standards are finalized. Approval of Attachment 1 by EPA will start this 45-day segment of the schedule for the Landfill Area Groundwater Design. It is currently anticipated that approval will be received by the end of December 2006.

Sincerely,



Maryellen Johns  
Project Engineer

Enclosure

CC: Lydia Duff/Grace  
Anne Sheehan/GeoTrans  
Mitch Obradovic/Remedium  
Dave Fuerst/O&M Inc.  
Gretchen Muench/US EPA

**ATTACHMENT 1. RECOMMENDED EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FOR GROUND WATER REMEDIATION TREATMENT SYSTEM DISCHARGE TO SINKING POND, ACTON, MA - 12/14/06**

W.R. Grace (Acton Plant), Acton MA Ground water remediation system and treatment facility. Discharge to Sinking Pond, Acton, MA. 6 acre - Fresh Water Kettle Pond, avg. depth 15.7 ft., Pond Volume = 4.1 million cubic feet  
Proposed Discharge Q = 0.288 MGD (0.446 cfs) note: the final effluent discharge rates will be determined in the design

Contaminants of Concern	Discharge Limits (Dilution Factor = 1)		Point of Compliance	Source and Comments	RELATED NUMERIC CRITERIA					
	Maximum Daily µg/l	Average Monthly µg/l			Freshwater		Human health for		Drinking water MCL µg/l	Other µg/l
					Aquatic life criteria		the consumption of			
					CMC µg/l	CCC µg/l	water and organisms µg/l	organisms only µg/l		
<u>Limits</u>										
Chromium III (hardness = 67.3 mg/l CaCO <sub>3</sub> ) <sup>(9)</sup>	579.3	27.7	Effluent of treatment plant	Aquatic Life	579.3	27.7	NAC	NAC	NAC	
Iron	NAC	1000.0	Effluent of treatment plant	Aquatic Life	NAC	1000.0	NAC	NAC	NAC	
Lead (hardness = 67.3 mg/l CaCO <sub>3</sub> ) <sup>(9)</sup>	14	0.5	Effluent of treatment plant	Aquatic Life	14	0.5	NAC	NAC	15	
Nickel (hardness = 67.3 mg/l CaCO <sub>3</sub> ) <sup>(9)</sup>	145.2	16.1	Effluent of treatment plant	Aquatic Life	145.2	16.1	610	4600	NAC	
Phosphorus	NAC	18.0 <sup>(12)</sup>	Effluent of treatment plant	Aquatic Life						
<u>Interim Limits</u>										
Arsenic		4 <sup>(1)</sup>	Effluent of treatment plant	Best Professional Judgment <sup>(1)</sup>	340	150	0.018	0.14	10	1.5 <sup>(7)</sup>
<u>Whole Effluent Toxicity</u>		% effluent								
LC50		100.0								
C-NOEC		100.0								
<u>Monitoring only</u>										
Beryllium	monitoring only		in Sinking Pond		NAC	NAC	NAC	NAC	4	50 <sup>(10)</sup>
Chloroethane	monitoring only		in Sinking Pond		NAC	NAC	NAC	NAC	NAC	
Manganese	monitoring only		in Sinking Pond		NAC	NAC	50	100	NAC	
Methyl tertiary-butyl ether (MTBE)	monitoring only		in Sinking Pond		NAC	NAC	NAC	NAC	NAC	70 <sup>(11)</sup>
Methyl ethyl ketone (MEK)	monitoring only		in Sinking Pond		NAC	NAC	NAC	NAC	NAC	4000 <sup>(11)</sup>
1,1-Dichloroethylene (1,1-DCE)	monitoring only		in Sinking Pond		NAC	NAC	330	7100	7	
Vinyl Chloride	monitoring only		in Sinking Pond		NAC	NAC	0.025	2.4	NAC	
Benzene	monitoring only		in Sinking Pond		NAC	NAC	2.2	51	5	
1,2-Dichloroethane	monitoring only		in Sinking Pond		NAC	NAC	0.38	37	5	
1,2-Dichloropropane	monitoring only		in Sinking Pond		NAC	NAC	0.5	15	5	
Methylene Chloride	monitoring only		in Sinking Pond		NAC	NAC	4.6	590	NAC	
Trichloroethylene (TCE)	monitoring only		in Sinking Pond		NAC	NAC	2.5	30	5	
Bis(2-Chloroethyl)Ether	monitoring only		in Sinking Pond		NAC	NAC	0.03	0.53	NAC	
Bis(2-Ethylhexyl)Phthalate	monitoring only		in Sinking Pond		NAC	NAC	1.2	2.2	NAC	
1,4-Dioxane	monitoring only		in Sinking Pond		NAC	NAC	NAC	NAC	NAC	3 <sup>(8)</sup>

- Notes:
- (1) The interim arsenic limit is a goal for the chemical precipitation metal removal system specified in the ROD (the "Treatment System") and is based on best professional judgment and the current lack of a complete fish consumption pathway. The interim arsenic limit is also, in part, based on the arsenic removal achieved by the jar testing results presented in the Pilot Test and Treatability Study Report (GeoTrans 2003). Within 2 years of the startup treatment system, a report will be submitted which summarizes the Treatment System optimization efforts and results. The report will document the arsenic concentration that the Treatment System is capable of achieving on a consistent basis. The concentration documented in this report will be used to establish a final arsenic limit, which may be set at a level above or below the interim limit of 4 µg/l.
  - (2) Highlighted values represent the criteria used for developing recommended discharge limits or monitoring requirements.
  - (3) CMC = criterion maximum concentration for acute effects.
  - (4) CCC= criterion continuous concentration for chronic effect.
  - (5) Drinking water MCL is maximum contaminant level.
  - (6) NAC = no applicable criterion.
  - (7) Based on a bioconcentration factor for bluegill sunfish of 4
  - (8) Based on proposed drinking water standard for Massachusetts
  - (9) Recommended discharge limits for metals are for total recoverable metals.
  - (10) Massachusetts' groundwater standard GW-3 for protection of aquatic life.
  - (11) Massachusetts' Drinking Water Guideline.
  - (12) Based on aquatic life, utilization and aesthetics

These values reflect requirements of the NPDES program and not the clean up goals for groundwater. These values do not consider the potential for recontamination of any remediated sediment. Grace should evaluate the possibility of recontamination of sediments at these effluent limits and implement the Sinking Pond sediment remedy accordingly.